University Library

A gateway to Melbourne's research publications

Minerva Access is the Institutional Repository of The University of Melbourne

Author/s:
Camilleri, David John

Title:
An investigation into the relationship between the engagement, creative ability, and classroom culture within secondary schooling.

Date:
2021

Persistent Link:
https://hdl.handle.net/11343/295087

Terms and Conditions:
Terms and Conditions: Copyright in works deposited in Minerva Access is retained by the copyright owner. The work may not be altered without permission from the copyright owner. Readers may only download, print and save electronic copies of whole works for their own personal non-commercial use. Any use that exceeds these limits requires permission from the copyright owner. Attribution is essential when quoting or paraphrasing from these works.

An investigation into the relationship between the engagement, creative ability, and classroom culture within secondary schooling

David John Camilleri (530725)

ORCID: 0000-0003-1745-8790

Ph.D. Education
August 2021

Melbourne Graduate School of Education
The University of Melbourne

A thesis submitted in total fulfilment of the requirements for the degree of

Doctor of Philosophy

Produced on archival quality paper

ABSTRACT

This study examines how creative ability is influenced by students' beliefs about the classroom culture and its relevance to their learning endeavours. Current education provision favours students who perform patterns of actions traditionally associated with academic achievement. This approach disadvantages students who are creative in non-academic domains. Research has neglected the teaching of high ability students who are disengaged with regular classroom cultures that restrict their opportunities to display their creativity.

The study used a mixed methods approach to investigate the learning characteristics of disengaged high ability students that predict creative outcomes in various domains. It identified differences between learning characteristics of high ability engaged and disengaged students. The disengaged students felt marginalised and showed learning profiles that were suited to non-academic learning contexts.

The findings suggest that classroom engagement and culturally acceptable creative expression requires appropriate perception and exploitation of symbolic and material affordances in the form of culturally acceptable patterns of actions, during socially and materially situated activities, when creating artefacts in their classroom. This implies engagement is a relational concept that represents the transactions and interactions between a student and their teacher, the symbolic and material affordances, and artefacts within a specific classroom or school culture. The study recommends classroom-based assessments teachers can use to identify the patterns of perception and action that lead to engagement and provide opportunities for all students to develop their creativity.

This page has intentionally been left blank

DECLARATION

This is to certify that:

- the thesis comprises only my original work towards the degree of Doctor of Philosophy
- due acknowledgement has been made in the text to all other material used
- this thesis does not exceed the word limit of 100,000 words in length, exclusive of tables, maps, references, and appendices

Signed: D.Camilleri

David John Camilleri

December 2021

PREFACE

Given the depersonalised style in which this thesis is written, this preface will provide some background to the study to help the reader understand how the project came to be. This thesis has emerged out of socio-cultural relations that have consistently excluded students for being overly difficult to engage within regular schooling. Historically, students have carried the weight of this failure to succeed in formal education. Thankfully, schooling does not equate to education, nor is formal education the only path to success in society…this latter point is changing though. For the most part, society values institutionally recognised domains of knowledge and forms of cultural reproduction that serve to recreate the past and privilege certain institutional knowledge over others. Schooling is a mechanism designed for conformity and standardisation; with an irrelevance clear to students who are excluded.

My relationship to schooling was problematic from the start. We were not an academic family. My parent's education ended at primary school. My dad was illiterate, and English is my mother's second language. While they valued education and saw schooling as the key to success, they had no idea about how to 'do' school. Following the norm in our family, I never finished secondary school. I dropped out 3 days into year 11. In those 3 days of year 11, I received 2 detentions for wearing the wrong socks and was asked to write a 400-word essay for English. Faced with the prospect of another 2 years of detentions and essays, I left school the next day. I become an apprentice boilermaker, building and modifying truck chassis and bodies. Before this point I had been in school for 14 years because I was kept back in year 5 and 7 due to not being up to standard.

Some highlights of my schooling include receiving my first detention in grade 1 for fighting. In grade 4, I climbed over the 3-metre-high school fence as a shortcut to the bus stop. This was to the dismay of my teacher. I could climb onto all the school's roofs and would often do so to

retrieve balls. I was quite effective at avoiding detection. In grade 4, I rarely completed homework. I preferred to play when I was at home and I would only work on projects I liked. For this type of behaviour, I was made to sit in front of the office every lunch time for 2 terms doing homework from the night before.

My transition into high school wasn't smooth either. The year 7 coordinator asserted that I was too old to be playing with Lego and action figurines, so my parents disposed of them. This impacted me greatly and I retaliated by damaging school property and challenging teachers even more than I previously did. I was politely asked to find a different school for year 8. My new school accepted me on the proviso I start in year 7 again. Year 7 at the new school started off well with high achievement. However, in year 8, things started to change. I become quite bored with school and disengaged again. I began fighting again and was constantly in trouble with teachers.

Like many disengaged students, some teachers appreciated me; others overtly said they didn't want me in their class. In some classes, I was made to sit at the front facing the wall with my shoes off because I had the wrong shoes on and was being disruptive. Fights were a common occurrence necessitating sharp instincts. The consequences for the alternative were painful.

One teacher would send me to the library all through year 9. The librarian was always baffled and couldn't understand why I was always sent there for being disruptive given I was 'such a lovely student'. She was respectful and caring to students, so we reciprocated. Coincidently, I saw her at the school reunion 25 years later and explained what I do for work and study, she said 'it's the naughty ones that turn out the best'. While I doubt the universality of this statement, I can see her caring and patient disposition and the ethic of care guiding her work at the school.

I have achieved beyond expectation since dropping out of school early. After returning to education at 23 years of age, I have completed B.A (hons.) in Philosophy, M.Arts Philosophy, M.Ed, M.Teach, and this PhD. And so now, here we are, and I am a student once again at the mercy of

my teachers. However, this time it is different. I have been given an opportunity to study something I am passionate about and am privileged to have so many generous mentors guide me. This has kept me engaged through the hard days, months, years, where the demands of 2 children grinds you down, or the sadness of losing your dad weighs upon you.

My task has been to produce an artefact to show my perceptions and actions meet the expectations of the institutionally selected audience. And you my audience, whose mind I have attempted to leap into based on my understanding of your place within this culture and its place within your mind. You will decide if my artefact is acceptable and whether I belong in your culture. I hope my use of the cultural tool known as 'academic writing' allows you to take a pleasurable walkthrough my thoughts…this thesis is the crystallisation of 40 years of thinking and feeling as a student, secondary teacher, researcher, university lecturer, parent amongst many other things. A big thanks to the examiners who have accepted my work. My best audience yet!

Parts of this thesis have been read by professional editor Esme Murphy in accordance with the guidelines laid out in the university endorsed national 'Guidelines for Editing Research Theses'. This study received a Commonwealth supported fee offset scholarship. Furthermore, this project received the Dr Lawrie Shears scholarship for outstanding PhD research from the DET of Victoria in 2016.

Saħħa
(Strength – Health - Goodbye)

ACKNOWLEDGMENTS

I would like to acknowledge the DjaDjaWurrung and Wurundjeri as the Traditional Owners of the land on which I live and have written this thesis, and pay my respects to the Elders, past, present, and emerging. I would like to acknowledge all those students who don't have a voice. Disadvantaged and marginalised because they don't look, talk, dress, or think the same as others.

I would like to thank all the schools and students who worked with me on this project and the DET Victoria and CEM for granting me access to these schools. Without you all, this project could not have happened.

I sincerely thank all those people who gave me an opportunity to grow personally and professionally. These opportunities have enabled me to flourish as a student and educator…to step out of my past and create a new path and bring others along with me. To my supervisors, Prof. John Munro, AP. John Quay, and Dr. Maurice Toscano, who have been with me for 7 years, your faith in my ability to complete this project helped me believe I can do it. Thank you to Prof. Helen Cahill, Prof. John Hattie, Dr. Richard Sallis, Prof. John Polesel, Dr. Rod Fawns, Dr. Joe Santoro, Dr. Annie Gowing, Katie Bauer, and Jo Hoyne for your feedback and assistance along the way. Thank you all for your generosity and support. Lastly, an acknowledgement to Dr. Jim French my philosophy teacher at Broadmeadows TAFE for introducing me to philosophy.

A big thank you to my friends and family. My Mum and Dad have unconditionally loved and supported me as I took up studies as an adult, and I am grateful for their support beyond words. Their dedication is admirable and reflective of a loving commitment to their children and each other. My brother Peter for always loving his little brother how he knows how to. My partner Hannah, whose love for our family has enabled me to finish this thesis. I look forward to post-thesis life with you, Wren, and Albi. I love you all.

Contents

ABSTRACT.....i
DECLARATION.....iii
PREFACE.....iv
ACKNOWLEDGMENTS.....vii
LIST OF TABLES xiv
Chapter 1: Introduction.....16
1.1 Overview..... 16
1.2 Current Trends and Perspectives on Creativity.....16
1.2.1 Creativity in Australian Education Provision.....18
1.2.2 Conceptions of Creativity.....21
1.2.3 Creativity and Engagement 26
1.3 Statement of the Problem.....31
1.4 Outline of the Present Study.....33
Chapter 2: Literature Review.....36
2. Overview of the chapter.....36
2.1 Background.....37
2.2 Integrating Componential, Systems, and Ecological Models of Engagement and Creativity in the Five A's Framework.....38
2.3 Audiences in a School Context.....38
2.3.1 Teachers as Audience.....40
2.3.2 Audience in Theories of Creativity.....41
2.3.3 Student engagement as relations and transactions with the classroom audience.....47
2.4 Affordances: opportunities for action.....49
2.4.1 Affordances and Classroom Cultures.....50
2.4.2 Affordances summarised.....53
2.5 Actions.....53
2.5.1 Types of thinking in a classroom: Transactions and interactions with artefacts and affordances.....54
2.5.2 Sequential Thinking Actions.....55
2.5.3 Crystallised and Fluid Thinking Actions.....57
2.5.4 Creative Thinking Actions.....60
2.5.5 Inferential thinking Actions.....61
2.5.6 Divergent Thinking Actions.....62
2.5.7 Convergent Thinking Actions.....63

2.5.8 Critical Thinking Actions……64
2.6 Artefacts in a school context……66
2.6.1 Artefacts in a classroom culture……67
2.6.2 Constraints on Artefacts……69
2.7 Actors: Student as Actor……73
2.7.1 Motivation……73
2.7.2 Self-efficacy……78
2.7.3 Attention and Perception……79
2.7.4 Identity ……82
2.7.5 Schizotypy……85
2.8 Chapter summary and Hypotheses……87
2.8.1 Hypothesis 1……89
2.8.2 Hypothesis 2……90
2.8.3 Hypothesis 3……90
Chapter 3: The Current Study ……91
3.1 Background to the Conceptual Framework and Rationale ……91
3.2 The Conceptual Framework: A Framework for Understanding Engagement of Secondary School Students ……96
Chapter 4: Method and Research Design ……97
4.1 Research Design……97
4.2 Research Sites and Participant Selection……98
4.2.1 School Selection……98
4.2.2 Participant Selection……99
4.3 Operational definitions……100
4.3.1 High Ability……100
4.3.2 Classroom Engagement……103
4.3.3 Ability and Engagement……103
4.4 Data Collection……106
4.5 Measuring Academic Thinking Actions……106
4.5.1 Academic Actions Assessment 1: Detroit Test of Learning Aptitude……108
4.5.2 Academic Actions Assessment 2: Raven's Progressive Matrices……109
4.5.3 Academic Actions Assessment 3: Mill Hill Vocabulary Scale……110
4.6 Measuring Creative Thinking Actions……112
4.6.1 Creative Task 1: Social Problem-solving Task……115

4.6.2 Creative Task 2: The Broken Cup……115
4.6.3 Creative Task 3: Picture Shape Game……116
4.6.4 Creative Task 4: Alternative Uses Task……117
4.7 Measuring Non-cognitive Factors of the Student as Actor……117
4.7.1 Knowledge of the Actor as Student……120
4.7.1.1 Organismic Learning Capital……120
4.7.1.2 Actional Learning Capital……120
4.7.1.3 Telic Learning Capital……121
4.7.1.4 Episodic Learning Capital……122
4.7.1.5 Attentional Learning Capital……122
4.7.1.6 Creative Self-efficacy……123
4.7.1.7 Schizotypal Personality Measures……124
4.7.1.8 School Engagement……125
4.7.1.9 Motivation……127
4.7.2 Knowledge of the Audience……128
4.7.2.1 Knowledge of Creative Support……129
4.7.2.2 Knowledge the Culture……130
4.7.2.3 Knowledge of the Social……131
4.7.2.4 Knowledge of Teaching……132
4.7.3 Knowledge of Affordances……133
4.7.3.1 Practised Creativity……133
4.7.3.2 Economic resources……134
4.7.3.3 Material Affordances: Infrastructural……135
4.7.3.4 Knowledge of School Improvement……135
4.7.4 Knowledge of Artefacts: Domains of Expression……136
4.7.5 Implicit Theory of Creativity……137
4.8 Procedure……137
4.8.1 Assessment of Creative Outcomes……138
4.8.1.1 Creative Assessment 1: Social Problem-solving Tasks……139
4.8.1.2 Creative Assessment 2: The Broken Cup……140
4.8.1.3 Creative Assessment 3: Picture Shape Game……142
4.8.1.4 Creative Assessment 4: Alternative Uses Task……143
4.9 Data Organisation and Analysis……144
4.9.1 Qualitative Analysis……145

4.9.2 Quantitative Analysis……146
Chapter 5: Results……147
5. Overview of Results, Trends, and Interpretations……148
5.1 Results for Hypothesis 1……148
5.1.1 Academic Thinking Actions of the Learning Profile……149
5.1.2 Results of ANOVA Examining Difference of Academic Thinking Actions of Engagement Categories……150
5.1.3 Factor Analysis of Creative Thinking Actions of the Learning Profile……151
5.1.4 Results of ANOVA Examining Differences of Creative Thinking Actions between Engagement Categories……153
5.1.5 Factor Analysis of Non-cognitive Factors of the Learning Profile……153
5.1.6 Results of ANOVA Examining Differences Between Non-Cognitive Factors of Engagement Categories……158
5.1.7 Results of Initial Cluster Analysis……158
5.1.8 Expression of Creativity by Classroom Engaged and Disengaged Students……165
5.2 Results for Hypothesis 2……166
5.2.1 High Ability Students' Implicit Theories of Creativity Focus on Creative Actions……167
5.2.2 Results of ANOVA: Average Ability vs. High Ability Engaged vs. High Ability Disengaged on Academic Learning Actions……168
5.2.3 Results of ANOVA: Average Ability vs. High Ability Engaged vs. High Ability Disengaged on Creative Thinking Actions……169
5.2.4 Results of ANOVA: Average Ability vs. High Ability Engaged vs. High Ability Disengaged on Actor, Affordance, and Audience Questionnaire……170
5.2.5 Cluster Analysis for High Ability Engaged and Disengaged Students……173
5.2.6 High Ability Students and School Improvement……179
5.3 Results for Hypothesis 3……180
5.3.1 Total Creative Actions……183
5.3.2 Social Problem-solving Task……183
5.3.3 Figural Drawing……184
5.3.4 Broken Cup……185
5.3.5 Divergent Thinking Actions……186
Chapter 6: Discussion……187
6.1 Hypothesis 1……187
6.1.1 Comparing Academic Thinking Actions between Engagement Groups……187

6.1.2 Comparing Creative Thinking Actions between Engagement Groups……191
6.1.3 Comparing Actor Attributes between Engagement Groups……194
6.1.4 Comparing Perception of Affordances between Engagement Groups……196
6.1.5 Comparing Perceptions of Audiences between Engagement Groups……198
6.1.6 Comparing Artefacts and Engagement Groups……200
6.1.7 Developing Learning Profiles……201
6.1.8 Summary of Hypothesis 1……204
6.2 Hypothesis 2……206
6.2.1 Actions and High Ability Students……206
6.2.2 Comparing Academic Thinking Actions between Ability and Engagement Groups Comparing Creative Thinking Actions between Ability and Engagement Groups……206
6.2.3 Comparing Actor Attributes between Ability and Engagement Groups……208
6.2.4 Comparing Actor Attributes between Ability and Engagement Groups ……209
6.2.5 Audience, Affordances, Artefacts and High Ability……210
6.2.5.1 Action dimension……210
6.2.5.2 Actor dimension……211
6.2.5.3 Affordances dimension……212
6.2.5.4 Artefact dimension……213
6.2.5.5 Audience dimension……214
6.2.6 High Ability Learning Profiles……217
6.2.6.1 High Ability Profile 1……217
6.2.6.2 High Ability Profile 2……218
6.2.6.3 High Ability Profile 3……218
6.2.6.4 High Ability Profile 4……219
6.2.6.5 High Ability Profile 5……219
6.2.7 Summary of Hypothesis 2……220
6.3 Hypothesis 3……220
6.3.1 Creative Artefact in a Classroom Culture……221
6.3.2 Summary of Hypothesis 3……223
Chapter 7: Implications, Recommendations, and Conclusion……225
7.1 Contribution of the Present Study……225
7.1.1. Implications for Engagement……227
7.1.1.1 Engaging Disengaged Students……227
7.1.1.2 Engaging Disengaged High Ability Students……230

7.1.1.3 Creative Engagement in Academic Classrooms Using the Five A's……231
7.1.2 Implications for Wellbeing……237
7.1.2.1 Audience and Relationship Building……237
7.1.2.2 Affordances and Behaviour Management……239
7.2 Limitations of the Present Study……241
7.3 Suggestions for Further Research……243
7.4 Concluding Remarks……244
References……245
APPENDICES……305
Appendix A - Plain Language Statements and Consent Forms……306
Appendix B - Script for presentation to students……309
Appendix C - Social Problem-Solving Score Card……310
Appendix D – Broken Cup Task……311
Appendix E - Figural Drawing Prompt (Shape Game) and Score Card……312

LIST OF TABLES

Table 1. *Five A's Framework*……*24*

Table *2. Likelihood of Gifted Characteristics in General Population*……*101*

Table 3. *Ability Group Characteristics*……*102*

Table 4. *Engagement Group Characteristics*……*104*

Table 5. *Ability and Engagement Group Characteristics*……*105*

Table 6. *Extended Five A's*……107

Table 7. *Breakdown of assessments*……*111*

Table 8. *Overview of Creative Action Assessment* ……*113*

Table 9. *Overview and Schedule of Assessments*……*138*

Table 10. *Type of Analysis and Data source*……*144*

Table 11. *Exploratory Factor Analysis for Academic Thinking Actions*……*149*

Table 12. *Mean score of Academic Thinking Actions for engagement categories*……*150*

Table 13. *Exploratory Factor Analysis for Creative Thinking Actions*……*151*

Table 14. *Mean Comparisons for Engagement Categories on Creative Thinking Actions*……*154*

Table 15. *Exploratory Factor Analysis for Actor, Affordance, Audience Questionnaire*……*155*

Table 16. *Mean and Standard Deviations of Engagement Categories on Actor, Affordance, Audience Components*……*159*

Table 17. *Final Cluster Centres and ANOVA*……*160*

Table 18. *Distance between final cluster centres*……*161*

Table 19. *Cluster groups' Engagement and Domain of Ability*……*161*

Table 20. Categorical Representation of Cluster Group Characteristics ……*162*

Table 21. *Percentages of responses for engagement category*……*167*

Table 22. *Mean percentage of categories to emerge from responses of High Ability Students*……*168*

Table 23. *Ability and Engagement Academic Thinking Actions ANOVA*……*169*

Table 24. *Mean creative thinking scores for each high ability engagement category*……*171*

Table 25. *Results of ANOVA for Ability and Engagement Categories*……*172*

Table 26. *Cluster Analysis for Ability and Engagement*……*173*

Table 27. *Final Cluster Centres and ANOVA for High Ability only*……*174*

Table 28. *Categorical Representation of Significant High Ability Cluster Characteristics*……*175*

Table 29. *High Ability Students' Mention of Five A components*……*180*

Table 30. *Summary of themes mentioned by High Ability Students*……*180*

Table 31. *Results of Linear Regression*……*181*

Table 32. *B and significance level of T-test for Total Score*……*182*

Table 33. *B and significance level of T-test for Social Problem-solving Task*……*183*

Table 34. *B and significance level of T-test for Figural Drawing*……*184*

Table 35. *B and significance level of T-test for Broken Cup Task*……*185*

Table 36. *B and significance level of T-test for Divergent Thinking Actions*……*185*

Chapter 1

Introduction and Rationale

1.1 Overview

The primary issue of concern in this thesis is how creative ability is influenced by a student's perception of their classroom culture. To explore this issue, the current study investigates students' understanding of creativity and examines their learning profile i.e. a description of cultural, emotional, social, and cognitive characteristics. It seeks to offer new knowledge on how best to characterise and positively engage the emotional, social, and cognitive dimensions of disengaged high ability secondary students. In order to do this, the learning profiles of disengaged students and high ability students are examined, as well as the cognitive and non-cognitive factors that are most likely to lead to their displays of creative thinking in a regular classroom.

This chapter outlines current trends and perspectives in the conceptualisation of creativity as well as the current Australian educational policy context. The chapter argues that student engagement is an overlooked factor in the development of creative ability and some conceptions of creative expression may lead to disengagement. An overview of the study is also provided concluding with an outline of each chapter.

1.2 Current Trends and Perspectives on Researching Creativity

Currently, in the research literature, creativity represents the production of something novel and useful (Runco, & Jaeger, 2012), effective novelty (Cropley, 2006), or the ability to produce novel and appropriate works (Sternberg & Lubart, 1996). These definitions refer to the simplest attributes of *creativity* (Amabile, 1995). The challenge for educators and researchers has been in finding a means of consistently and systematically identifying and developing creativity (Kaufman, 2011).

Creativity is seen as something to be nurtured and promoted in schools. It is recognised as a key skill required for educational, workforce, economic, and life success (Barr et al., 2008; Jaussi, 2007; Learning, 2015). Issues have arisen when policies and programs assume a unidirectional and homogenous learning trajectory (Rappolt-Schlichtmann et al., 2009). Fredricks et al. (2004) and Watt et al. (2017) emphasised the importance of enjoyment, effort, and curiosity for student engagement. Consequently, when a school assumes that all students express their creative thinking in the same way, some students will disengage, fall behind, and miss out on crucial learning[1], and become alienated from formal education. Student engagement becomes an important factor to consider when seeking to develop creative ability in secondary schools. Understanding the intersection between creativity and engagement is thus crucial for understanding how to support students develop their creative ability.

A final point to clarify is the use of 'Gifted'. In this thesis, the descriptor 'high ability' will be used to describe gifted and talented students. The approach taken in this thesis follows Matthews et al. (2013) who argue the term *gifted*[2] is of little value in predicting a student's

[1] Falling behind compromises a student's future contribution to society while increasing the potential for future delinquency and mental health issues (Finn & Rock, 1997; Hirschfield & Gasper, 2011; Lamb & Huo, 2017).

[2] Gagné (2013) describes *gifted* and *Talented* as

- *'Giftedness* designates the possession and use of untrained and spontaneously expressed outstanding natural abilities or aptitudes (called gifts), in at least one ability domain, to a degree that places an individual at least among the top 10% of age peers' (p.5).
- ' Designates the outstanding mastery of systematically developed competencies (knowledge and skills) in at least one field of human activity to a degree that places an individual at least among the top 10% of 'learning peers' (those who have accumulated a similar amount of learning time from either current or past training)' (p.5).
- Runco (2005) defines 'creative giftedness' as: (a) an exceptional level of interpretative capacity; (b) the discretion to use that capacity to construct meaningful and original ideas, options, and solutions; and (c) the motivation to apply, maintain, and develop interpretative capacity and discretion (Runco, 2005).

achievement at school because precocity may not lead to expertise or exceptional performance within a domain. Additionally, Subotnik et al. (2011) define gifted students as individuals could possibly become eminent in the suitable conditions. McBee et al. (2012) assert that this view of giftedness is more relevant to high-ability psychology. According to McBee et al. (2012), 'the knowledge that a particular child could potentially become an eminent adult given the right developmental experiences provides little information about immediate educational need' (p.212). In response to this, they assert the way forward involves the field of high ability studies making a distinction between high ability psychology and advanced academics. High ability psychology is theoretically oriented research agenda whereas advanced academics is an interventionist and developmental research agenda (p.211). This study is situated primarily in high ability psychology because it seeks to understand the symbolic and material conditions for engaging high ability students.

1.2.1 Creativity in Australian Education Provision

Australia's policy context has shown a clear valuing of creativity. The Melbourne Declaration on Educational Goals for Young Australians (Barr et al., 2008) advocated for creativity to be part of educational provision, suggesting something more than traditional arts-based creativity such as music and sculpture. Furthermore, the inclusion of critical and creative thinking as a general capability in the Australian Curriculum (Australian Curriculum Assessment and Reporting Authority (ACARA, 2012) reinforced the push to develop the creative ability of Australian students. This shift toward including critical and creative thinking in the Australian Curriculum matched that of many other OECD countries with an emphasis on economic growth (de Bruin & Harris, 2017). More recently, the Alice Springs (Mparntwe) Education Declaration (Education Council, 2019) prioritised two distinct but interconnected goals: Goal 1: the Australian education system 'promotes excellence and equity'; and Goal 2:

all young Australians become 'confident and creative individuals, successful lifelong learners, active and informed members of the community' (p.4). This study aligns with the goals of the Mparntwe declaration.

Within Australia, there has been a push from the Victorian government to focus on promoting creativity. This flows from one of the major findings of the Victorian Parliament's *Inquiry into the Education of Gifted and Talented Students* in Victorian schools: that high ability students are often neglected and have lacked appropriate provision (Parliament of Victoria, 2012). The inquiry reported that, on a system level, educational provision has assumed that all students learn in the same way, at the same pace (Parliament of Victoria, 2012). Methods of identification of high ability students have been insufficient because they did not lead to a change in how students were taught (Santoro, 2016).

Following the inquiry, a Victorian government initiative emerged outlining a plan to provide students with the resources they require to excel. The *Aiming High* strategy (DEECD, 2014) sought to enhance learning opportunities for high ability students by equipping educators with the tools to identify such students. The rationale for *Aiming High* pointed to the negative consequences of inaction: some learners suffer from isolation, low self-esteem, anxiety, and depression when their ability is not identified, they are insufficiently challenged, or they feel 'out of sync' with their peers (DEECD, 2014, p.10). High ability students who disengage[3] or deliberately underachieve to fit in with their peers, become disruptive, or exit early from schooling.

[3] Fredricks (2011) conception of engagement identifies three dimensions: students are identified as 'engaged' with learning when they actively participate in classroom activities (*behavioural* engagement); when they esteem the learning environment positively (*emotional/affective* engagement); and/or when they are willing to invest effort to understand the task (*cognitive* engagement). Put simply, an engaged student participates appropriately both physically and mentally, with such participation underpinned by an emotional commitment.

Students who constantly find little reward at school may leave at the end of their compulsory schooling (schooling in Victoria is compulsory to age seventeen), following years of disengagement and of being misunderstood (Smyth & Hattam, 2004). This reality reflects international trends that seek to understand disengaged students and where they fit into formal schooling. More specifically, traditional conceptions of ability have been exclusionary (Renzulli, 2005). As a result, disengaged students are overlooked if they do not exhibit learning profiles typical of academically achieving students (Betts 1988; Kim & VanTassel-Baska 2010). Identifying how students perceive and respond to affordances in their classroom can provide insights into how to support disengaged students participate at school.

With a State government election in 2014, a new incoming Victorian government replaced *Aiming High*. The new government launched alternative programs to promote creativity in Victoria, one being *Creative Victoria* which espoused the importance of education in developing the creativity of Victorians: 'we have to invest in our people and their creative capacity, and in particular, their capacity to innovate' (DETV, 2016). In addition to *Creative Victoria*, the Department of Education and Training Victoria (DETV) launched a digital resource with comprehensive information relating to high ability students (Victoria, 2017). This resource gave teachers and parents guidance in supporting students' academic and emotional development (Victoria, 2017), representing some progress in making appropriate provision for developing creativity ability in schools.

Taking these initiatives further requires understanding how and why some high ability students fail to thrive and become disengaged in formal schooling. From a policy perspective, creativity is seen as positive and something that should be promoted. Victoria's new policy signalled a shift in the direction toward promoting creativity in schools. Yet, many schools remain unable to engage students and support them to complete school and enter adulthood

prepared for productive citizenship (Lamb & Huo, 2017; O'Connell & Watterston, 2019). While formal schooling involves preparation for working life, it is also a deeply personal endeavour given productive citizenship requires the ability to be creative in professional as well as personal domains (ACARA, 2012). It is thus imperative that schools engage students in ways that support the development of their creative ability.

1.2.2 Conceptions of Creativity

How creativity is defined matters. Traditional conceptions of ability emphasised the early identification of innate gifts such as creativity or verbal reasoning (Ericsson et al., 2009). Problematically, approaches that only utilise standardised tests to measure advanced cognitive abilities often measure only formal cultural knowledge (Seeley, 1984; Sternberg, 2003). Recent conceptualisations of ability have led researchers to reconsider how they measure ability in more inclusive ways (Santoro, 2016). Glăveanu (2014) argued that 'what needs to be explored further, of course, are the patterned ways in which people relate to cultural artefacts and distribute their action depending on aim and context' (p.53). Doing so shifts the emphasis to qualitative aspects of learning, with a focus on patterns and structures rather than levels (Cropley, 1994).

More recent conceptions of ability focus on resources, culture, systems, and networks. There has been a shift away from the view that men (not women) are the only creators and that individuals create in a socio-cultural vacuum. Glăveanu labelled this transition as a movement from the 'He' paradigm to the 'I' paradigm; the current shift is toward a 'We' paradigm (Glăveanu, 2010, 2013, 2015a, 2015b). This is exemplified in Mönks and Mason (2000) extension of Renzulli's (1986) 'three-ring model' (above average ability, task commitment, and creativity) to include three domains of people: parents, teachers, and peers. Likewise, multifactorial models of ability including the Munich Model of Giftedness (Heller et

al., 2005), the Differentiated Model of Giftedness and Talent (DMGT) (Gagné, 2013), and the Actiotope Model of Giftedness (Ziegler, 2013), overtly include social moderators such as people, educational institutions, and forms of capital.

The multi-componential nature of creativity is now accepted among prominent researchers (Amabile, 1996; Batey & Furnham, 2008), requiring the investigation of multiple factors using multi-method analyses (Wolfradt & Pretz, 2001). In a recent manifesto titled 'Advancing Creativity Theory and Research: A Socio-cultural Manifesto', 20 leading scholars of creativity research, marked the conceptual shift in the understanding of creativity (Glăveanu et al.,2020). The common belief amongst these leaders in the field is that creativity and culture are intertwined[4] (Glăveanu et al.,2020).

The general approach to researching creativity utilises Rhodes' Four Ps of creativity[5] (Glăveanu, 2010, 2015). In Rhodes' framework, creativity is located in four places: a person, processes, products, and the (environment) press (Rhodes, 1961). In the Four Ps, the physical and sociocultural context are conflated. This led to Simonton (1990) adding 'persuasion' to the list of 'places' of creativity, noting the importance of persuading others of the importance of a creative work —an aspect long held important by Sternberg (1999). Even though Rhodes' (1961) framework has assisted researchers organise their research, it has reinforced 'an individualistic, static, and often disjointed vision of creativity' (Glăveanu, 2013, p.69).

To overcome some of these issues, Glăveanu (2013) reconceptualised the Four P's into five dimensions: the actor, action, artefact, audience, and affordances (the first three relate to person, process, and product, whereas audience and affordances relate to creative press/environment) (p.70). The Four P's underemphasised sociocultural aspects of the

[4] This is a working assumption of this thesis.
[5] Simonton (1990) extended the Four Ps to include persuasion and potential (Runco, 2006). Potential is problematic because determining potential relies on performance.

creative process, leading to the development of the Five A's (Glăveanu, 2015). This evolution of models highlights the importance of understanding how internalising culturally-valued ideas in the classroom is necessary for success in a traditional classroom (Munro, 2006b). Socio-cultural factors are now seen as fundamental factors involved in the creative process. Considered thus, creativity involves types of thinking that are unconventional and nonconformist (Runco, 2014). An individual who is creatively productive and successful within a culture has found a balance between following some norms (such as standard communication) and breaking some others (such as establishing a link that others thought to be improbable/impossible).

The Five A's framework conceptualises the creative process 'as a form of action by which actors, materially and symbolically, alone and in collaboration with others, move between different (audience) positions and, in this process, imaginatively construct new perspectives on their course of action and its resulting artefacts which afford greater reflexivity and the emergence of novelty' (Glăveanu, 2015, p.172). Glăveanu's description of the *creativity complex* extends previous literature that claims 'creativity is the interaction among aptitude, process, and environment by which an individual or group produces a perceptible product that is both novel and useful as defined within a social context' (Beghetto, 2005, p.255). From this perspective, creativity involves 'perceiving, exploiting, and generating novel affordances during socially and materially-situated activities' (Glăveanu, 2012, p.192). Creativity thus arises out of the interaction between a person and their physical and sociocultural environment, which applies, of course, to classroom contexts.

The Five A's framework describes creativity not as a 'thing' but rather as action in and on the world. It contains five components of creativity —actor (personal attributes), action (coordinated psychological and behavioural manifestation), artefact (product as

cultural artefact), audience (socio-cultural factors), affordances (the interdependence of creators and a material world) (Glăveanu, 2013). Each component is summarised in table 1.

Table 1
Five A's Framework

Components	Focus	Brief Description
Actor	Personal attributes in relation to a societal context	The actor is a person embedded in the field of social relations specific to any human community and society.
Actions	Coordinated psychological and behavioural manifestation	Action is both psychological and material, internal and external, goal-directed, structured, and symbolic or meaningful. Creativity is not a 'thing' but an action in and on the world.
Artefact	Cultural context of artefact production and evaluation	Referring to products as artefacts draws attention to their 'cultured' nature and the cumulative character of creation in human groups and societies. Indeed, unlike products, artefacts can never standalone but are cultural.
Audience	The interdependence of creators and a social world	Represents multiple others assisting, contributing, judging, criticising, or using the creative act and/or resulting artefact(s).
Affordances	The interdependence of creators and a material world	The affordances of the environment are what it offers to the individual, what it provides or furnishes, either for good or ill.

(Glăveanu, 2010, 2013, 2014)

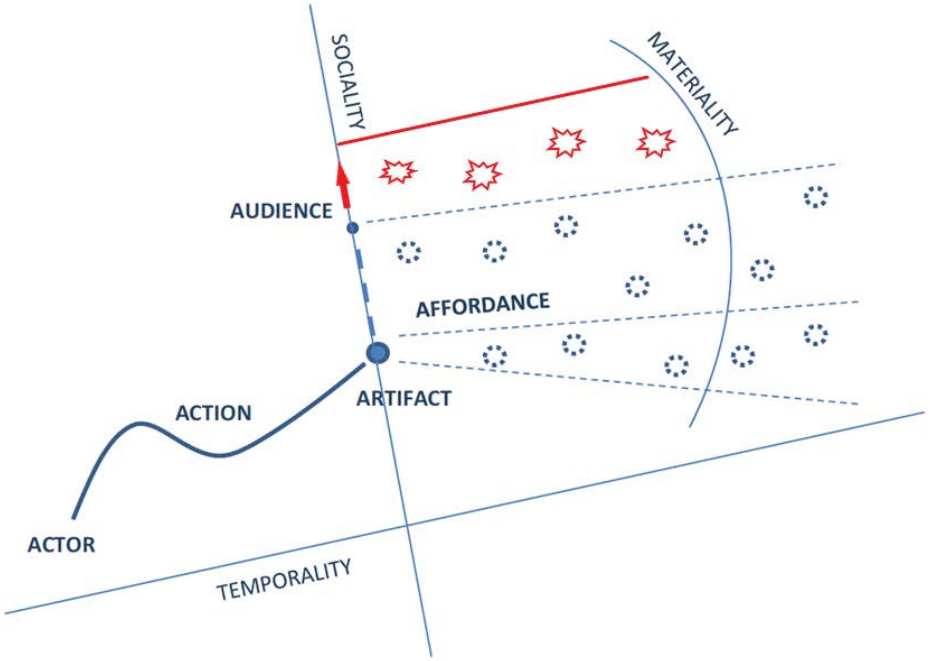
According to the Five A's framework, human action is 'embedded within a horizon of possibility' (p.168). These possibilities are constrained by cultural conventions. Glăveanu (2015) states that 'we are faced with a relatively predictable future in terms of the things we do and the way we interact with others or use objects; this generates a set of expectations about the social and material reality we inhabit' (p.167). From the perspective of the current project, it is worth pointing out that predictability of the future within a certain culture depends on the student's previous exposure to and internalisation of that cultural perspective.

Important to this study is Glăveanu's (2015) diagram as shown in figure 1, represents the 'relatively narrow tunnel of options emerging from the artifact' (p.167). Glăveanu's point that the actor takes on the perspective of their audience when they are creative is crucial. When a student is able to take on the perspective of their teacher, they are more likely to exploit the intended opportunities found in artefacts in their classroom. These students' actions match the affordances being endorsed by the audience, which in turn leads to accessing more positively oriented opportunities and achievement within that culture. These opportunities are represented by the blue circles.

The addition of the red lines symbolises an extra socio-cultural space where the affordances that arise out of an artefact may lead to actions that are deemed inappropriate or denounced by the audience or culture. Glăveanu (2015) claims the creative actor is always able to take on the perspective of an audience; doing so allows the actor to imagine and pursue new action pathways afforded by the environment. In a classroom culture, the only perspective of importance for achievement is that of the teacher. The Five A's framework offers a new way to see the old problem of disengagement. In chapter 2, each of the five dimensions will be unpacked in greater detail. The next section further builds on the argument

that the development of creative ability first requires a student to be engaged with their classroom culture.

Figure 1: Adapted from (Glăveanu, 2015)



1.2.3 Creativity and Engagement

Student engagement is a multidimensional concept, broadly defined as 'the quality of a student's connection or involvement with the endeavour of schooling and hence with the people, activities, goals, values, and place that compose it' (Skinner et al., 2009, p.494). From this perspective, engagement occurs in three ways: cognitively, behaviourally, and affectively. Cognitive engagement represents students' mental investment in school, their perception of the relevance of classroom learning, and their ability to self-regulate (Landis, 2013). Affective engagement with school points to a student's sense of belonging and their perception that support is available from teachers and peers (Appleton et al., 2006). When a student feels like they belong at their school and a sense of relatedness to teachers and peers, they feel valued and are more likely to remain in school (Furrer & Skinner, 2003). Further to this, based on

student and teacher reporting, Furrer and Skinner (2003) demonstrated that children with a higher sense of relatedness showed higher levels of emotional and behavioural engagement. Indicators of engagement include time committed to classroom tasks, homework completion, academic success, school attendance, compliance with school rules, preparation for class, and extracurricular participation (Landis, 2013; Reschly & Christenson, 2006).

Conversely, 'disengagement' encompasses students who are acting inappropriately in relation to the school or teachers' expectations of their students; that is, they are 'not engaged' with learning or following the cultural norms of their school. It is important to note that engagement/disengagement represents a spectrum; where students are located on that spectrum depends on the individual, the subject, the teacher, and the school (Muller, 2001). Common indicators of a disengaged student include a lack of initiative, persistence, or effort, and a tendency towards being passive, inattentive, mentally withdrawn, or in arrears with their work (Furrer, 2003).

Students are more likely to achieve academically and graduate if they participate appropriately in terms of responding to teacher demands, are interested in a range of diverse subjects, and know how to manage their own learning (Ladd & Dinella, 2009; Valiente et al., 2008). An absence of these characteristics results in the student being labelled or categorised as disengaged; that is, there is an absence of expected behavioural and emotional participation in prescribed learning in the formal school setting. Put simply, an *engaged student* embodies appropriate actions underpinned with a sufficient level of emotional commitment to learning.

A common misconception of 'disengaged' students relates to their characteristics. It is assumed that they are young males from low SES backgrounds, but this is not entirely true (Arbuckle & Little, 2004; Beaman et al., 2007; Espelage et al., 2003; Marks, 2000; Sullivan et

al., 2014). Young males seem most problematic when only overt indicators of disengagement are considered, indicators such as acting out or not completing work, showing aggression, seeking attention, displaying antisocial or disruptive behaviour, continuously moving around class, or interacting in unhelpful ways (Finn & Rock, 1997; Montuoro & Lewis, 2015). It is crucial to point out that these behaviours are not gender specific. That said, less overt disengagement (passive disengagement) is more likely to be seen in female students (Goss et al., 2017), though all students may use strategies to draw out simple tasks to fill the time available, or work only under supervision, or intermittently (Goss et al., 2017). Many high ability students understand the rules of school, manipulating them in their favour (Siegle, 2009). Boredom is a common issue in Australian schools (Goss et al., 2017). This may arise from underestimating the student's ability (Galton et al., 1999), but perhaps also arising from lessons being seen as irrelevant or culturally misaligned by students (Dogra, 2004).

Finn's (1989) Participation – Identification (PI) model, suggests that active participation (behavioural engagement) in school leads to academic achievement and an academic identity[6], with a sense of belonging and a valuing of school (affective engagement) (Reschly & Christenson, 2006). Conversely, the PI model identifies a lack of participation, little school success, and poor academic identity as factors associated with secondary school dropout (Fredricks et al., 2004; Van Uden et al., 2013). Participation is crucial and, as Finn and Cox (1992) assert: 'If a youngster does not become involved in learning activities in the first two or three grades . . . it is highly unlikely that he or she will become involved in later grades' (p.159). This points to the importance of motivation and goals given that motivated students show eagerness or a preparedness to participate, while those not motivated to learn

[6] A way of being

show little to no interest, drive, or preparedness to engage (Munro, 2006a). In the same way, when a student is motivated to be creative, attention is drawn to this, and resource allocation takes place so that the appropriate cognitive and affective systems are engaged (Bruning et al., 2011).

A classroom culture that does not recognise and validate a student's knowledge will lead to that student becoming disengaged (Finn & Rock, 1997). Disengagement is presumed to be more common in students whose knowledge and ways of being-in-the-world do not match that which is required for success in their classroom or their school (Wills, 2009). Poor environmental fit, a mismatch between actors and their environment may have detrimental consequences for students. If a student enjoys little success in their classroom, they may develop implicit theories of intelligence that work against their own academic development and problem solving in everyday life (Dweck, 2000). It follows that measuring achievement at school in a limited way, solely through academic outcomes, undermines socially and culturally diverse ways of knowing, doing, and being, and that 'in an era when curricula content is being narrowed to accentuate academic gains, a broader understanding of what constitutes positive school success is needed' (Catalano et al., 2009 p.259).

Motivating adolescents and stimulating their interest in academic subjects can be an uphill battle for teachers (Legault et al., 2006; Ford & Roby, 2013). According to a report published by leading Australian public policy think tank, the Grattan Institute, forty per cent of Australian school students are unproductive on a regular basis (Goss, 2017). The reasons for this vary and discussions around what counts as 'production' ought to be undertaken. That said, the report acknowledged that some teachers lack the relational (classroom management) skills to engage students; for example, forty per cent of students disclosed being given no reason for their removal from class (Goss, 2017). The report also showed that many

students are not sufficiently challenged in class. Currently, it is unknown how many high ability students are disengaged from regular classroom programs or how many leave schooling early because of boredom. Identifying disengaged students before they drop out is crucial (O'Connell & Watterston, 2019). What *is* known is that, in general, disengaged students struggle to find full-time employment when they leave school, leading to reduced long-term incomes and highly unstable futures (Lamb & Huo, 2017). The relevance of classroom learning is thus crucial for engaging students.

Reengaging students who are unproductive involves understanding their ability to perform mental and physical actions as well as their perception of the material and socio-cultural relations they are being asked to connect with at their school. This is especially true for high ability learners. Being identified as high ability does not determine academic success (Siegle & McCoach, 2009). Many high ability students become disengaged for emotional and social reasons, such as boredom or having no opportunity to demonstrate their knowledge (Munro, 2006a). Shavinina (2010) suggests that understanding the unique cognitive experiences of high ability students is crucial to maintain their engagement with classroom learning. Currently there is abundant research on how to facilitate creativity in engaged students (Beghetto, 2013; Beghetto & Kaufman, 2014) but not on how to develop the creative ability of disengaged high ability students. Overcoming these issues means identifying disengaged students' learning characteristics by moving away from traditional achievement tests and looking at other identifiers of ability (Seeley, 1984; Sternberg, 2003).

High creative ability manifests in a classroom in many ways. Some indicative behaviours include acting and thinking in unexpected and novel ways, finding problems, or questioning authority; because of these behaviours, these students can be seen as a problem by teachers (Kim, 2008, Kim & VanTassel-Baska, 2010; Westby & Dawson 1995). Karwowski

(2010) showed that 'creative students were perceived as more intellectually efficient, dynamic, and excitable, whereas 'good' students were more agreeable and conscientious' (p.1235). Further to this, previous research indicates that even when a teacher speaks of the value of creativity, the classroom culture may find no room for it to flourish amid the pressures of curriculum, testing, and the complexities of classroom dynamics (Baldwin, 2010; Beghetto, 2013; Gajda et al., 2017a).

The development of creative ability within a classroom thus requires consideration of symbolic and material affordances available to students given 'creative' action is a cultural, social, and psychological event (Hennessey, 2003). In their seminal paper on gifted education, Subotnik et al. (2011) conclude general ability is 'necessary but not sufficient to explain optimal performance or creative productivity' (p.13). They go on to say that the task of researchers is to understand more about the role of 'domain specific abilities, psychosocial skills, motivation, and opportunity' in optimal performance (p.13). Confluence theories such as the 'Systems Theory' argued for by Csikszentmihalyi (1998) contribute by showing that excellence emerges out of a system or culture of ideas after interaction between an individual and their environment. Importance should therefore be placed on trying to explain the whole as a product of relations between the components, not simply focusing on isolated components (Glăveanu, 2015). Furthermore, Ziegler et al. (2019) argue against 'traditional individualistic approaches to the study of high abilities and talents that neglect environmental aspects' (p.48). Developing creative ability entails engaging students through providing appropriate material and symbolic opportunities to share their knowledge.

1.3 Statement of the Problem

This study seeks to understand how a student's perception of the audience, affordances, and artefacts in their school affects their engagement with school and subsequent development

of creative ability using the Five A's framework. The focus of this research primarily centres on students' perceptions of their teachers because 'perceived interpersonal teacher behaviour is by far the most important predictor of all types of student engagement' (Van Uden, et al., 2014, p.29). Further to this, it has been argued that some students are less likely to internalise ways of thinking fostered in the classroom (Munro, 2011a); in other words, they are less likely to be externally programmed[7] in terms of the cultural norms they come into contact with (Galang, 2010). The concern is that classroom cultures which value only selective expressions of creative thinking limit a student's creative ability by pre-determining how potential is translated into performance (Csikszentmihalyi, 1998; Ludwig, 1992; Runco, 2007)[8]. When this occurs, students disengage from school and miss opportunities to develop their creativity.

Goss et al. (2017) argue it is vital that teachers create classroom cultures that value 'raising student expectations, developing a rapport with students, establishing routines, challenging students to participate and take risks. These all affect how much their students engage and learn' (p.7). Further to this, Goss et al. (2017) reported that only fifty per cent of high-performing students feel challenged at school. Consequently, fifty per cent of students are not being challenged and are possibly underperforming. Underperformance of high ability children is distinct from low achievement of average ability students since high ability students can underachieve (relative to their capacity) yet still achieve to a high standard in a classroom (relative to others). This is an issue that requires immediate attention given

[7] Internalise cultural norms, values, and behaviours

[8] There are many tests for understanding creative thinking (Lubart, 2011; Torrance, 1972; Urban, 2004), however these tend to focus on primary school children with some neglecting non-cognitive factors i.e. perceptions of the culture in which they are expected to be creative.

underachievement is a key identifier of disengagement and dropout risk among high ability students (Landis & Reschly, 2013; Reis & McCoach, 2000).

To research this issue, Glăveanu's (2013) Five A's framework was operationalised for secondary school settings because of the focus on actions within a culture. A focus on non-cognitive aspects of the creative process such as the artefacts, affordances, and audiences, provides a language to describe interactions and relations involved in displays of creative thinking in a classroom. This is especially important when considering how to differentiate teaching to afford students the opportunities to engage with classroom tasks.

This research aims to better understand thinking actions related to classroom-based artefacts and affordances. Additionally, this study examines how a student's perception of the audience influences the development of their creative ability within a secondary school context. The implications for educators are twofold: first, to identify learning characteristics of dis/engaged students so classroom cultures can provide appropriate material and symbolic affordances; and second, provide teachers and researchers with a new way of seeing the old problem of disengagement. The study seeks to contribute to the capacity of schools to create an environment in which students can develop their creative ability.

1.4 Outline of the Present Study

Some students fail to thrive in their classroom and become disengaged from formal schooling. Disengagement is detrimental to a student's wellbeing and creativity but also presents a challenge to teachers and school leaders. To better understand some of the issues associated with disengagement, this research aims: (1) to examine learning profiles of engaged and disengaged students; (2) to understand how high ability students define creativity; and (3) to determine which combinations of cognitive and non-cognitive factors are most likely to lead to displays of creative ability in a secondary classroom.

Chapter 2 reviews current research on engagement, creativity, and wellbeing from the perspective of the Five A's framework. It is argued that engagement and creative expression are a result of a student's perception of the audience, affordances, and artefacts in their classroom. These perceptions are culturally acquired and are co-determined through previous individual-environment interactions. Disengagement thus occurs when there is a mismatch between the student and their teacher's perception of affordances and artefacts in their classroom. Further to this, the actor's attributes and patterns of action are outside what is expected according to the cultural norms in that classroom. While behaving in unexpected ways is important for creativity, it may also be viewed as a problem. Teachers set the culture of classrooms and function as a formal 'audience' or gatekeeper in the classroom, managing the interactions and transactions between students (actors) by offering opportunities (affordances) for knowledge expression, legitimising creative actions and artefacts, and evaluating formal knowledge transactions. Engaging a student involves recognising what that student is able to do and having that student feel like their participation is valued within that classroom. This valuation will determine subsequent opportunities to engage with classroom tasks and practice being creative. Chapter 2 closes with a summary of the literature and the hypotheses are introduced and explained.

Chapter 3 further develops the Five A's framework for the present study with a rationale given for the selection of this approach. The study methods used to conduct the research are outlined in Chapter 4. A concurrent nested design was used to guide the study's method. The research utilised quantitative and qualitative analysis to confirm, cross-validate, or corroborate findings. To understand the issue, three categories of engagement, Classroom Engaged students (CE), Classroom Disengaged students (CD), and School Disengaged students

(SD), are compared for similarities and differences in their learning profile. These categories represent the current institutional identities of the students however, a cluster analysis is also deployed as a means of representing the nuance within the cohort. The results, trends, and implications of the study are described in Chapter 5.

Chapter 6 will discuss the findings of the study; results are interpreted to test the hypotheses outlined in chapter 2. The learning profiles of engaged and disengaged as well as high ability students are analysed and discussed to elucidate how interactions and relations are critical to the development of a student's creative ability. This chapter will then discuss results relating to displays of creative actions. Chapter 7 discusses the implications of the research and offers concluding remarks. This chapter argues that disengagement may arise when a student is unable to reproduce patterns of behaviour expected within their classroom culture because they have not internalised the actions and actor attributes deemed appropriate by their audience. Furthermore, their perception of the affordances and artefacts in their classroom lead to patterns of action that have been deemed inappropriate by their classroom culture. The mismatch between the norms of the classroom culture contributes to alienation and the students seeking other places to express their creativity. In other words, their learning profile mismatches the ecology of their school thereby excluding them from participating in the classroom culture.

Chapter 2

Literature review

2. Overview of the chapter

In this chapter, current research on engagement, creativity, and wellbeing, is reviewed and interpreted from the perspective of the Five A's framework as described by Glăveanu et al. (2020), who assert that 'old literature should be revisited and not abandoned' (p.744). Given the rich scholarship on creativity and engagement, it would be counterproductive to disregard insights from previous research in the field. Creativity research is intrinsically complex and relational, and the topic should be treated as such (Glăveanu et al.,2020). The following review is an attempt to constrain the constructs found in the literature.

To better understand this complexity, the following review brings together insights and research from multiple domains, to an examination of the Five A's: actor, action, artefact, audience, affordances. Firstly, the *audience* dimension will be unpacked to explicate the importance of socio-cultural relations in a classroom in terms of the Teacher as Audience and gatekeeper of creative expression in their classroom. Secondly, *affordances* are discussed to highlight the relationship between perception and opportunities for creative expression in classrooms. It is argued that engagement and creative expression are a result of a student's perception of affordances in their classroom. These perceptions are co-determined through previous individual-environment interactions. Consequently, disengagement occurs when there is a mismatch between perceptions of affordances: student and teacher see different opportunities for action, academic or creative, in the same space. Thirdly, the types of thinking *actions* required to appropriately engage with affordances in a classroom environment are elucidated. These actions are critical for accessing information in classrooms as well as expressing creativity in the form of an acceptable artefact. It is often assumed that all students

can complete these actions however many students are unable to do so. Fourthly, *artefacts* are described as holding latent cues for potential actions in the form of affordances, and the role of culture in determining the perception of these action cues. The teacher creates a task/artefact for the student to complete then teacher becomes the audience who judges the students' responses to the affordances in the task/artefact. Engaging with the task means replicating the teacher's thinking and intention of the task by responding to the intended cues for action. Finally, the *actor* dimension is unpacked considering the student as actor acting on the artefacts and their perceived affordances as supplied by the teacher as audience. In the final section of this chapter, all elements are drawn together into the Five A's framework to research the issue outlined in chapter 1.

2.1 Background

High ability students have been the focus of many studies on engagement (Caraisco, 2007; Gentry et al., 2011; Karenevsky, 2011; Siegle et al., 2014). The reasons for *high ability* students disengaging from formal learning are similar to those for other students:

- Irrelevant lessons, feeling bored and apathetic (Kanevsky, 2011; Tomlinson, 1999; VanTassel-Baska, 2010; Goss et al., 2017)
- Ineffective teaching – lack of differentiated instruction and poor classroom management strategies (Brouwers & Tomic, 2000; Landis & Reschly, 2013; Siegle et al., 2014; Watters, 2010)
- Lack of caring teachers, no sense of belonging: isolation as an individual or segregation as a group can fuel disengagement (Marks, 2000; Boon & Lewthwaite, 2016)
- Misguided teacher expectations relating to the student's capacity (Kolb & Jussim, 1994; Galtonet al., 1999; Emerick, 2004; Peterson, Rubie-Davies, Osborne, & Sibley, 2016)

- A lack of opportunity in terms of students transferring their own social experiences (rules, values, and ways of interacting with others) to the predominantly middle-class expectations of the school system (Prosse et al., 2008; Ripke et al., 2008; Jones & Vagle, 2013, VanTassel-Baska, 2018)

2.2 Integrating Componential, Systems, and Ecological Models of Engagement and Creativity in the Five A's Framework[9]

Previous focus on developing creative ability has tended to focus on advancing students who show their knowledge in culturally acceptable ways while revealing little about how cultures either support or hinder the development of creative ability in disengaged students. Attention in this study centred on providing the material or symbolic conditions to support disengaged high ability students who have not internalised the ways of being in regular classrooms. The Five A's framework —actor, action, artefact, audience, affordances— and the movement toward ecological models is an attempt to change the 'fundamental language of the discipline by using terms that explicitly endorse a systemic, contextual, and dynamic approach' (Glăveanu, 2013, p.39). The Five A's framework offers a way of seeing relations and interactions involved in classroom cultures.

2.3 Audiences in a School Context

Schools are learning environments that operate as 'ecosystems of knowledge transfer and behavioural development' (deBruin & Harris 2017, p.24). Within the Five A's framework, the audience dimension represents the interdependence between the creative actor and their social world; this includes any person who assists, contributes, judges, critiques, or uses the created artefact[10] (Glăveanu, 2014). Following Csikszentmihalyi's (1998) Systems Model of

[9] Conceptual framework has been represented graphically on page 107 - Table 6: Extended Five A's.
[10] Teachers use the student's artefact as evidence of learning.

Creativity, this thesis argues the teacher functions as the audience and gatekeeper of the culture in their classroom and a fundamental factor for consideration when understanding the development of creative ability. Culture influences, in a positive or negative way, what can be said; it determines what is acceptable and possible by constructing opposition between creative and uncreative, regular and irregular, normal and abnormal, engaged and disengaged (Best, 1991). Classroom cultures not only influence the types of things students think about, but also how and when their creative ideation is translated into performance (Runco, 2007).

It is also important to acknowledge that schooling emerges out of a fundamentally white middle-class conception of education that privileges specific cultural patterns of action, many of which position culturally and linguistically diverse students (low-SES students included) as 'outsiders' (Apple & Beane, 1999; Boon & Lewthwaite, 2016; Hooks, 2014;). These 'outsiders' may not be able to apply their own rules, values, and ways of interacting with others to the classroom context. On the other hand, academically successful minority students learn to recognise that different cultural contexts require different patterns of action (Boon & Lewthwaite, 2016; Harrison et al., 1990). Culturally diverse students who are unable to adapt in this way may be characterised as defiant or aggressive by teachers who may not recognise social actions that are outside their frame of reference, that is, white and middle-class (Ripke et al., 2008; Jones & Vagle, 2013). As a result, many disengaged students go through formal education undetected, potentially falling years behind peers in relation to curriculum expectations (Angus et al., 2009).

The acquisition of sociocultural knowledge involves converting social relations, which are heavily embedded in cultural practices, into mental functions (Glăveanu, 2014; Rogoff, 2003; Vygotsky, 1980). Furthermore, it has been argued that how one uses cultural tools is the basis of intelligence (Bruner, 1975). The norms around tool use influence the creative

thinking and behaviour of those being creative within that culture (Csikszentmihalyi, 1998). This highlights the relationship between a student's ability to perform culturally appropriate actions in response to the teacher's tasks. Accordingly, the better one is able to use the tools in a specific culture, the better the individual will be at completing the tasks[11] the tools were meant for. Consequently, cultural values are intertwined with the vocabulary, expressions, and actions involved in the *creative* act[12] and students who have internalised the values and knowledge of the classroom are more likely to be seen as creative by the gatekeepers/audience.

2.3.1 Teachers as *Audience*

Feeling unsupported by teachers can have a detrimental effect on students' wellbeing and creativity (Anderson et al., 2004; Morrison & Allen, 2007; Roorda et al., 2011; Roorda et al., 2017). These findings are significant because they reinforce earlier research that found warm and supportive teachers positively influence effort and perseverance in middle years students (Lee, 2012)[13]. Echoing research on positive teacher-student relationships, Amabile (1996) recognised that stimulating, supportive, and positively challenging environments enable creativity to be nurtured in a positive way (p.262). Since Amabile's work in the 1980s and 1990s, an abundance of research has further strengthened the proposition that supportive teacher behaviour is positively influential in the development of creativity (Baer & Kaufman, 2012; Barbot et al., 2011; Beghetto, 2013; Beghetto & Kaufman, 2014; Gajda et al., 2017; Sak, 2004). For instance, rewarding and recognising creative ideas and products through positive

[11] Classroom tasks are the creative artefacts of teachers.
[12] Learning to use these tools is a process of socialisation; however, socialisation may be more difficult with Low Latent Inhibition (Galang, 2010).
[13] This point is particularly important for high ability students given it was found that Australian students (younger than 13 years old) with IQs above 160 were significantly superior to their peers when conceptualising moral issues involving fairness, justice, and responsibility for self and others.

and constructive feedback enables the development of new ideas (Amabile et al., 1999; Shah & Ali, 2012). Further, Sternberg (1997) agreed that evaluative feedback should be positive and constructive: teachers should avoid shaming students for thinking above and beyond what is expected while also tolerating ambiguity and enabling sensible risk-taking.

Creative actors' perceptions of their social environment influence how they will respond to stimuli within that environment (Amabile, 1983; Bronfenbrenner, 2006). Bandura (1989), Vygotsky (1980), and Glăveanu (2015) highlight the importance of the 'other' as a source of knowledge, guidance, and perspective in learning situations, as well as in the creative process. Students therefore work with the perspectives available to them, that is, perspectives internalised through exposure to teacher feedback and enculturation in formal educational cultures. In other words, understanding students' perceptions of relational factors in their classroom might give some insight into how and why students respond to the material and symbolic affordances in the ways they do[14].

2.3.2 Audience in Theories of Creativity

In seeking to understand how creativity can be enhanced, Amabile's (1983, 1996, 2012) componential theory identifies three personal/actor components or aspects of the creative process: *domain-relevant skills*, *creativity-relevant skills/processes*, and *intrinsic task motivation* that take place in an external component (that is, the social environment). Importantly, Amabile (1983, 1985) is commonly cited for showing that intrinsic motivation is thwarted when students feel they will be assessed or negatively evaluated by a teacher. Even though Amabile does not use these exact terms, she noted the effect of the audience by recognising the influence of social interactions on a student's motivation to be creative. Specifically, Amabile

[14] While it is possible to include other institutional actors in the discussion of audience i.e. individuals at the Department of Education transmitting norms through policy, this is outside the scope of this study. The focus is on how students respond to the culture they perceive in their school.

(1985) showed that intrinsic motivation enhances the likelihood of creative outcomes, implying that taking on the other's perspective can enhance or limit creativity depending on how closely the actor identifies with the audience and on their perception of how their artefact might be perceived. Further, Amabile argued that creativity does not arise in a vacuum, that appreciating creativity means *appreciating* and *accepting* that some *norm* has *changed* (1996); hence the perception/knowledge of the classroom culture in terms of ways of being, knowing, and demonstrating 'creative' is an integral part of their learning capacity (Quay, 2013). The social environment can therefore influence the development of each personal component.

Following earlier linear models of creativity (Wallas, 1926), Amabile's (2012) creative process specifies the stages in producing novel and appropriate ideas. The first stage is *problem or task identification* which requires an awareness of the issue (motivation is crucial). In the second stage, *preparation*, domain-relevant skills are engaged to gather information and hone task-relevant skills. The state of the individual's knowledge and motivation coalesces in the third stage: *response generation.* In this third stage, possible solutions are considered before the fourth stage occurs: *response validation.* In this stage proposed solutions are evaluated for their effectiveness. In the fifth stage, the *outcome* of this process is shared with others to be evaluated for adoption, rejection, or modification (Amabile, 2012). This final stage is particularly focused on audience participation and influence, though the perspective of the other is present in the individual throughout the process.

From a cultural perspective, these audiences may be proximal/concrete or symbolic/abstract, though always influential through social transactions and interactions in a classroom. Extending his initial model, Urban (2014) acknowledges that additional social spaces exist albeit not referring to the social aspects as 'audience'. An audience as described by Urban could include family, peers, teachers, and education departments (Urban, 1999 p.5).

These sociocultural relations, transactions, and interactions with the audience take place in what Csikszentmihalyi (1988, 1996) refers to as *the field*. In his systems model, three components interact in a dynamic system through which creativity emerges: the *domain of knowledge* such as science, philosophy, or theatre; *the field*, consisting of the gatekeepers/ legitimisers of creative ideas or products to be recognised in the relevant domain; and *the person*, who qualifies as creative when they use the tools/symbols of the domain to create novel and useful artefacts as judged by the relevant domain (Csikszentmihalyi, 2014).

It has long been established that alignment to a certain group will most likely lead to interpretations consistent with the values and norms associated with that group (Turner et al., 1994). Schools, like other institutions, create discourses that direct thought and behaviour by defining a teacher's field of visibility (Feder, 2011). The idea of visibility is important when analysing creative actions/artefacts/actors/affordances in a classroom since group/institutional/classroom norms inform who, how, what, why, and when actions/artefacts/actors/affordances are 'creative'.

The social evaluation of an artefact has been a focus in the work of Haslam et al., (2013) who point to the importance of actor-audience connection in the creative process. Socio-cultural relations are fundamentally linked to creating artefacts. In particular, two aspects of the creative process have been shown to be highly influenced by group identity:

1. Acts of creativity where an individual creates from an understood paradigm; and
2. Appreciation of creativity where social judgments evaluate new ideas and products (Haslam et al., 2013, p.386).

Haslam et al. also found that when personal identity is more salient, an individual's creations will reflect their beliefs about their identity, making their work more about

themselves than others. On the other hand, when social identity is more salient, creative works are more likely to align with the group (Adarves-Yorno et al., 2006). When cultural opportunities are not conducive to students connecting with their teacher and peers, their creative work is less likely to align with the expectations of the teacher. When this occurs, students miss out on stable emotional, physical, and cognitive (creative) development. DeMoss, Milich, and DeMers (1993) found children may be aware that their support systems differ from those of other children and will seek what they need on their own. This implies that undervaluing a student's artefact will contribute to that student seeking alternative audiences to view and appreciate their artefact.

An actor's negative relationship with their audience may result in marginalisation and alienation. This is a concern because, when excluded, marginalised students miss opportunities to practise the normative ways of relating and transacting within their classroom culture. Consequently, these students are less likely to accept societal conventions and traditional routes to success (Albert & Colangelo, 1994; Ogbu, 1992; Smyth & Hattam, 2004). The socio-economic status (SES) of the family, for example, may affect an individual's emotional wellbeing (Albert & Colangelo, 1994; Olszewski-Kubilius, 2000). Specifically, Perry (2006) argued that social exchanges form the basis of communication with caregivers and significant others. When this is disrupted, language difficulties may arise, leading to further marginalisation and socio-emotional difficulties (Snow & Powell, 2012). It is important to note that some families may not value formal education because it is not important for success in their own culture (Pedersen & Dudgeon, 2002). Every culturally- and linguistically diverse student brings a different perspective to the classroom, however this may be to their detriment if they cannot assimilate. Marginalised students who are able to 'code switch' (Boon

& Lewthwaite, 2016) by performing actions in ways meaningful to their teachers will be more successful at school.

Some of these considerations have been applied to understanding high ability students (Munro, 2011). Opposing traditional conceptions of ability, the Actiotope Model of Giftedness[15] (Ziegler & Stoeger, 2008; Ziegler et al., 2014) shifts the focus to action and interaction. Ziegler and Baker (2013) have utilised Bourdieu's (1986) ideas of 'economic', 'social' and 'cultural' capital within a systems approach to investigate how to better facilitate the teaching/learning of high ability students and how to strive for excellence by understanding the role of the 'other' in terms of the resources they provide. The attainment of excellence, however, is an extreme process involving significant changes to an Actiotope.

Ziegler and Baker (2013) define social, cultural, and didactic capital as follows:

- 'Social educational capital includes all persons and social institutions that can directly or indirectly contribute to the success of learning and educational processes' (p.28);
- 'Cultural educational capital includes value systems, thinking patterns, models and the like, which can facilitate – or hinder – the attainment of learning and educational goals' (p.27); and
- 'Didactic educational capital means the assembled expertise involved in the design and improvement of educational and learning processes' (p.29). This is the professional

[15] The Actiotope Model of Giftedness focuses on actions and the development of goal-directed actions within a complex environment. It assumes achievement and expertise levels are reflected in the differences in the Actiotope components (Ziegler & Stoeger, 2008; Ziegler et al., 2014). Ziegler, Vialle, and Wimmer (2013) define an Actiotope as containing 'the individual and the material, social and informational environment with which that individual actively interacts' (p. 3). According to Ziegler (2011), Actiotopes are dynamic and adaptive to changing inner states and changing environments but are typically a stable system of interacting elements (resources/capital), with the development of gifts a successive expansion of an individual's action repertoire.

quality of the audience which would impact on the student's perception of, and connection with, the classroom and school.

Ziegler (2013) integrates other forms of capital[16] relevant to the audience dimension, such as didactic capital, into a construct called the 'sociotope'. A sociotope can be defined as a relatively stable environment that enables and regulates opportunities for action (Phillipson, 2013). The configuration and content of a sociotope indicates which repertoires of actions will be enhanced in the environment and which should be enhanced for excellence. A sociotope facilitates or constrains development depending on the objective action space, that is, value and esteem placed on the importance of learning as well as the resources and the Normative Action Space which represents the expected actions within an environment. This work further reinforces the argument for understanding the patterns of action involved in engagement and the subsequent development of creative ability.

Compared to the Subjective Action Space[17] which represents the possible actions an individual can carry out; the objective action space represents all possible actions that can be carried out in an environment. As well, the Normative Action Space represents expected actions within an environment. The Normative Action Space contains norms of the culture that are impressed on the individual by other people. The Normative Action Space may be supportive or neutral, or may reject ways of acting, depending on the culture. With appropriate support from the teacher, the student is more likely to engage with the learning and develop their ability. Within a focus on the subjective and the normative action space, it becomes important to consider the influence of teacher-student relationships. Given the

[16] 10 Capitals/resources: endogenous - Organismic, Actional, Episodic, Attentive, Telic capital
Exogenous – Cultural, Social, Didactic, Economic, Infrastructural capital
[17] This will be looked at in the 'Actions' dimension

teacher plays a key role in shaping the culture, insights can be gained from research investigating students' perceptions of their audience.

2.3.3 Student engagement as relations and transactions with the classroom audience

Teacher-student relationships form part of a student's working model of attachment figures (Ainsworth, 1979; Bowlby, 1969, 1973; Verschueren & Koomen, 2012). Represented within students' attachment models are the interactions students have with teachers, that is, their formal audience. These relational representations are continually being updated, making student engagement dynamic, occurring in time and between the student, other people, and systems/ecology (Bronfenbrenner 1992; Pianta & Walsh 1996). Furrer and Skinner (2003) showed that children with sensitive and responsive caregivers are more likely to function well at school socially and academically. Similarly, self-determination theorists assert student engagement occurs after basic psychological needs such as relatedness, competence, and autonomy are fulfilled (van Uden et al., 2014; Ryan & Deci, 2000). Building on this, classroom ecologies where teachers establish clear boundaries while supporting autonomy lead to higher engagement and better performance at school (van Uden et al., 2014). When teachers show interest in and care for students, a sense of closeness develops. The experience of positive relationships leads to positive representations of teachers in students' working models of attachment.

Students who feel supported at school see their school environment as emotionally engaging (Chong et al., 2018). In a wide-ranging research report into student engagement in Australia, Goss et al. (2017) report misbehaving students are less likely to receive support and encouragement but more criticism and punishment. Factors that thwart student engagement are varied; for example, structural factors such as school size and teacher-student ratio can play a significant role (Fredricks et al., 2004), as does a feeling of being rejected by the school

(Finn, 1989). Consequently, a student's participation in formal schooling is a combination of multiple interacting factors (Archambault et al., 2009a; Reschly & Christenson, 2006).

There is a clear pattern in the research showing teachers are more likely to form positive relationships with students who appear to try in class (Muller, 2001); and less likely to develop positive relationships with disengaged and marginalised students (Jennings & Greenberg, 2009). This is significant to consider because higher efficacy in students is associated with lower levels of behavioural disengagement and higher levels of student competencies (Chong et al., 2018). More specifically, perceived teacher support was related to students' personal strengths and academic buoyancy, that is, their capacity to overcome setbacks, challenges, and difficulties in academic pursuits (Chong et al., 2018). Consequently, disengaged students are exposed to risk factors such as poor teacher-student relationships and low self-efficacy (Morrison & Allen, 2007).

Importantly, teachers who develop positive relationships with at-risk students have a beneficial influence on these student's engagement and participation (Pianta & Allen, 2008; Van Uden et al., 2014). While teacher, family, and peer support of education can influence engagement at school by acting as an enabler or barrier to achievement (Fredricks et al., 2004; Klem & Connell, 2004), it should also be noted that children exhibiting problem behaviours in the first year of primary school modified their behaviour at school if they were able to form positive relationships with teachers (Hamre & Pianta, 2001).

It is clear from the research literature that engagement usually decreases as students progress through schooling (Fredricks et al., 2004; Gallup, 2016). Further to this, Roorda et al. (2017) found stronger associations between engagement in secondary school and positive teacher-student relationships when compared to primary school. Roorda et al. theorise that these results might 'indicate a cumulative effect in which negative relationships and

disengagement strengthen each other over time' (p.252). Additionally, Sointu (2017) reported similar findings showing positive student-teacher relationships increase the likelihood of positive school outcomes since positive teacher-student relationships directly influenced students' achievement. A key element of student engagement involves students feeling connected to their audience and feeling that their work will be valued by their audience. When the student feels their work is valued, they are more likely to show their creativity. The importance of teacher student relationships in a secondary school context is thus clear.

2.4 Affordances: opportunities for action

The ability to recognise symbolic and material cues in an environment allows a student to utilise the affordances in that environment. Within a classroom environment, affordances are specific combinations of properties in objects that perceived as *opportunities for action* (Gibson, 1977). From this ecological perspective, perception is co-determined through individual-environment interactions. Perception is thus something neither solely residing in an individual nor in their environment. Accordingly, 'ability does not reside in the head of the learner but is best conceptualized as a collection of functional relations distributed across persons and particular contexts through which individuals appear knowledgeably skilful' (Barab & Plucker, 2002 p.2).

As discussed in the previous section, concepts of intelligence, expertise, ability, and creativity have evolved to include non-cognitive factors. Importantly, this shift has seen researchers move away from Cartesian and other dualistic notions of knowing that de-contextualise knowledge. As Barab and Plucker (2002) point out, Cartesian dualism has led to many contemporary thinkers describing knowing 'as a psychological construct existing in the head' (p.166). Moving past the Cartesian view, the interdependence of individuals and their environments has become the focus on study in ecological psychology (Glăveanu, 2015).

Further to the term 'affordance', Gibson (1979/1986) introduced the term *effectivity*, defined as a specific combination of context-relevant properties organised by the individual to allow for a dynamic actualisation of possible actions (Turvey et al., 1981). Relating to this, Ziegler (2005) argues that excellence is a matter of performing increasingly complex actions in a variety of complex environments. Excellence as the performance of specific patterns of action highlights the interdependence between actors, the material and symbolic affordances in their environment, and the audience who evaluates the appropriateness of the actor's actions.

2.4.1 Affordances and Classroom Cultures

Creative ecologies in schools are dynamic environments that can support the development and promotion of critical and innovative thinking and practices (deBruin & Harris, 2017). However, the impact of the environment on creativity is not always investigated (Richardson, 2018). Recent work from Ziegler and Baker (2013) investigates the role of some material resources. It defines *infrastructural educational capital* as 'materially implemented possibilities for actions that permit learning and education to take place' (Ziegler & Baker, 2013, p.28). This concept is generally referred to in the literature as the design of the physical space and material resources for creativity (Beghetto & Kaufman, 2014).

There has long been agreement that students require material opportunities to engage in action (Guilford, 1977; Runco, 2003; Sternberg, 2006). Economic capital is considered an important factor in educational discourse. Bourdieu (1986) proposed cultural, social, and symbolic capital as disguised forms of economic capital with all forms of capital transformable into economic capital (p.91). Applying Bourdieu's ideas to the development of ability, Ziegler and Baker (2013) define economic capital as 'every kind of wealth, possession, money or valuables that can be invested in the initiation and maintenance of educational and learning

processes' (p.27). Accordingly, having economic capital can lead to enriching learning environments replete with objects to be creative with i.e. instruments, sports equipment, playgrounds, electronic devices and so on. Financial support may determine many aspects of learning in many contemporary educational contexts. However, having the material objects is not enough. Fundamental to expressing creativity in a classroom is the perception of opportunities to exploit the material and symbolic affordances of these objects (DiLiello & Houghton, 2008). Additionally, Sternberg argues, 'one could have all of the internal resources needed to think creatively, but without some environmental support the creativity that a person has within him or her might never be displayed' (Sternberg, 2012 p.6).

Bridging the gap between the environment and the individual, Barab and Plucker (2002) argue that the interdependence of the individual and their environment makes ability the actualisation of perceived affordances in the environment:

> 'instead of a property of individuals, we characterize ability or talent as a set of functional relations distributed across person and context, and through which the person-in-situation appears knowledgeably skilful. In other words, ability and talent arise in the dynamic transaction among the individual, the physical environment, and the sociocultural context' (p.174).

That is not to say that the individual does not matter or is absent; the perception of affordances occurs with the actor, agent, or individual. What is different with this approach is that a student's capacity to act develops in relation to, and is the effect of, the environment. Importantly, Barab and Plucker (2002) discuss how 'different features of the environment afford activities for an agent who has appropriate effectivities' (p.169).

For the most part, perception of affordances in an environment is based on prior learning, which in turn is a result of the environment itself. The key here is to understand students' experiences and how they influence their perception of the environment negatively or positively. As Lenarčič (2013) argues,

> 'Agents do not actively choose from a list of affordances, but the list of affordances is nonetheless existent, and the agent inevitably selects one, just as there are so many opportunities for action on an everyday basis that we inadvertently select one while being ignorant of the list of possibilities as a whole' (p.166).

These choices can be developed and could occur more rapidly for experts through repetition since expertise is partly determined by how a person perceives and responds to information, that is, affordances in the environment (Withagen, 2018). This accords with Gibson and Gibson (1955) who argue 'discrimination gets better with practice, both with and without knowledge of results' (p.38). It also seems to be supported by neural imaging research investigating large scale brain networks which shows the role of the salience network in creative cognition. More specifically, Adnan et al. (2019) showed that creative cognition involves functional connectivity between executive control, the fronto-parietal network (FPN), the salience network (SN), and the default network (DN). For a student to fit into their classroom, their perception must align with commonly perceived salient features of their environment. As with expertise, these perceptions become internalised and automatised the more they are practiced. A high achieving student is an expert at replicating their teacher's thinking and reproducing the knowledge transmitted in an appropriate artefact.

A student's creativity is thus evaluated in this process with the focus becoming assessment of appropriateness and replication of actions as determined by the gatekeepers. Barab and Plucker (2002) put it succinctly: 'exhibiting talented behaviour involves understanding how to act in a manner that is consistent with those ways that have been socioculturally endorsed—that is, functional for a particular group' (p.174). This reinforces points made above relating to creative appreciation, audience, and identity (Haslam et al., 2013). From an ecological perspective, therefore, novel cultural artefacts emerge out of an exploitation of symbolic and material affordances within a cultural context.

2.4.2 Affordances summarised

When a student perceives appropriate affordances and responds to material and symbolic affordances with expected patterns of action, they are deemed to be 'engaged'. This implies that when a student is disengaged, they are perceiving and responding to symbolic and material affordances within their classroom in a way that has not been endorsed by their teacher. Barab and Plucker (2002) place emphasis on 'the context through which talented transactions are engaged in and on increasing the potential of individuals to engage these transactions' (p.175). Engagement is thus relational and transactional, resulting from a student's perception of the affordances offered to them in the classroom but also from their capacity to perceive these affordances and respond effectively. These transactions are essential for showing the audience/teacher that students have internalised the intentions of the teacher i.e. enculturated in terms of using the tools of the culture appropriately. Being able to demonstrate knowledge in an appropriate way is thus critical.

2.5 Actions

For a student to produce (appropriate) artefacts in a classroom, it has already been argued that the actions leading to the artefact must align with audience expectations and must exploit the appropriate classroom affordances. The types of thinking actions required to appropriately respond to affordances in a classroom environment will now be discussed in relation to engagement and the development of creative ability. This section will describe how a student's response to material and symbolic affordances in a classroom culture results from their perception of these affordance and the types of thinking actions that student is able to perform. In other words, dynamic actualisation of a possibility for action occurs in response to their perception of affordances in the environment (Turvey et al., 1981).

2.5.1 Types of thinking in a classroom: Transactions and interactions with artefacts and affordances

Borrowing from research in cognitive psychology, specific cognitive processes such as verbal and non-verbal sequential reasoning/processing, basic verbal recollection, verbal memory, visual memory, fine motor skill, and attention are reviewed in this section. Hammil (1998) argued these are essential for successful participation in formal classroom settings. Further to this, Geake and Hansen (2006) reported overlapping patterns of neuronal activation between fluid and non-fluid analogising suggesting it is a basic cognitive process associated with classroom engagement. Accordingly, these specific processes represent crucial cognitive processes involved in classroom learning environments.

As argued in chapter 1, cognitive development means converting social relations into mental functions (Glăveanu, 2014; Rogoff, 2003; Vygotsky, 1980). Socialising or acclimatising students involves having training students to respond to stimuli with culturally appropriate pattens of action in response to specific cues. In section 2.3.2 this was referred to as cultural

capital (Ziegler, 2013). A students' perception of affordances in a task will influence the action patterns performed during their response. If students are unable to read these specific cues in the task as intended by the teacher, they are unlikely to perceive the task as an opportunity to share their knowledge but also fail to develop the thinking actions privileged at school. These students will appear behaviourally disengaged because they cannot act in culturally acceptable ways. The next section unpacks the types of thinking actions involved in engaging within a classroom environment.

2.5.2 Sequential Thinking Actions

According to Munro (2006), learning in a regular classroom predominantly involves sequential processing of both verbal and non-verbal information. All learners call on these two systems when encoding verbal and non-verbal information. Verbal encoding involves storing linguistic properties and semantic features whereas non-verbal encoding involves perceptual and spatial properties (Paivio, 1990, 1991). Based on this, it is argued that individuals who are more able to encode information in their environment, in terms of detailed and veridical (topographical) representations of the contextual cues and affordances in their environment, are better able to respond to opportunities in the environment.

In concrete terms, the better a student hears and understands a teacher's question, the better their response will be (the quality of response is also determined by the extent of their knowledge of the topic). Those students who align to the culture better than expected, that is, those who accept and replicate the ways of being in the culture, are called 'bright' or sometimes 'gifted' because they follow the lesson as intended by the teacher. The meeting of teacher expectation leads to a positive valuation of the student's ability. The same can be said for students described as 'creative' (Sternberg, 2012).

Classroom teaching is often sequenced and linear: from following instructions and discussion, to students interacting and transacting with new information via written and spoken communication. Generally, successive/sequential processing organises information in a serial arrangement. Any changes to this order render the pieces of information meaningless, much like rearranging the words in a sentence alters the meaning, such as in 'Peter pick up the cat' versus 'Cat up pick the Peter'. Sequential processing organises separate items into a sequence such as recalling a sentence, or sequence of events in a story. Sequential thinking processes facilitate grammatically fluent language output. Finally, syntactic information is sequential and underpins decoding texts (Das, 1992, 2002; Hammill, 1998; Mohanty, 1994).

On the other hand, information in a simultaneous arrangement is presented in a spatial or non-linear arrangement. While sentences are formed through sequential thinking processes, meaning at a word level results from simultaneous processing. Specifically, semantic networks are hierarchical, but they are also distributed (horizontally) through synonyms and similar words (McRae & Jones, 2013). Simultaneous processing relates to the relationship between individual items and their integration into a whole unit of meaning. Simultaneous processing is essential for inferring and comprehending texts as well as recalling the meaning of words (Cain & Oakhill, 1999; Oakhill, 1982). Further, simultaneous processing has been associated with the comprehension of logical and grammatical statements (Huang, 2011). Semantic understanding, which is associative and simultaneous, is different to sequential processing though both are essential for reading comprehension (Nation & Norbury, 2005).

Many underachieving high ability students struggle to transfer their knowledge into written form (VanTassel-Baska, 2018). Similarly, the school readiness of socio-economically

disadvantaged children tends to be inadequate given their oral language skills (Snow & Powell, 2012). These students are at higher risk of language delay and disorder, having greater difficulty with language use than with cognition (King et al., 2005; Nelson at al., 2011; Roy et al., 2014). Primary-aged students with a language disorder carry these issues into secondary school, resulting in generally lower levels of achievement (Conti-Ramsden & Durkin, 2012; Conti-Ramsden et al., 2012; Lindsay et al., 2007). Given that classrooms tend to be heavily dependent on reading, writing, and listening, sequential and simultaneous processing are fundamental to understanding and communicating ideas in a classroom.

2.5.3 Crystallised and Fluid Thinking Actions

Many theories of intelligence propose the construct of crystallised and fluid thinking ability (Carroll, 1997; Cattell, 1987; Woodcock & McArdle, 1998, Kaufman, 2013). Benbow and Stanley (1983) found two distinct domains of giftedness: verbal and non-verbal giftedness. According to Benbow and Minor (1990), 'Crystallized intelligence is heavily dependent on culturally-loaded, fact-oriented learning' (p.25). Crystallised thinking ability involves recalling culturally relevant declarative knowledge in the form of synonyms while simultaneous thinking is a primary cognitive process that facilitates this recollection. They are different but overlapping. Crystallised thinking ability in the form of vocabulary is a strong indicator of enculturation in formal learning since an important feature of regular classroom cultures is the use of verbal language/words. Children from disadvantaged communities scored lower on items that required crystallised thinking ability, cognitive level problem-solving, and simultaneous processing of information (Mlambo, 2017). This further highlights the importance of identifying specific learning characteristics of disengaged high ability students in terms of how well they match the affordances offered in their classroom.

Lohman, Gambrell, and Lakin (2008) found more variation in crystallised and fluid thinking ability in highly able students when compared to average ability students. Also, Munro (2005) found that enhanced ability in verbally gifted students meant being able to call on highly elaborated and differentiated semantic networks. In concrete terms, these students are more likely to have extensive vocabularies, efficient encoding and retrieval, and broad general knowledge.

While disengaged students may not seem to be highly able in terms of crystallised thinking ability, fluid thinking ability has been found to be a strength (Seeley, 2004; Seeley, 1984; VanTassel-Baska et al., 2007). Fluid thinking ability represents 'the ability to see complex relationships' (Benbow & Minor, 1990 p.25). This type of thinking is relational and analogical, finding associations between the structures within distinct mental representations to make sense of abstract patterns (Gentner, 1988; Goswami & Brown, 1989). Previous work has defined Fluid thinking ability as a basic cognitive process supporting creative thinking and mediated through working memory (Geake & Hansen, 2005). Interestingly, working memory was shown to matter more for Fluid thinking ability than for crystallised thinking ability (Benbow and Minor 1990). A reason for this may be that crystallised thinking ability involves culturally determined thinking actions that have been encoded and stored in long-term memory, while fluid thinking ability requires novel model construction and verification in response to the constraints of the problem.

The place of fluid thinking ability in a formal classroom is less obvious than crystallised thinking ability. Even though these thinking actions have been shown to be different, fluid thinking ability can predict changes in crystallised thinking ability and academic knowledge in primary school-aged children, up to the end of secondary, and possibly in tertiary education

(McArdle, 2001), as well as predicting reading ability (Ferrer et al., 2007). This suggests fluid thinking ability mediates the acquisition of other abilities.

There have been conflicting findings regarding the link between fluid and crystallised thinking ability and creativity. Batey and Furnham (2006) argued that fluid and crystallised thinking ability changes over a lifetime: fluid thinking ability is more important for *Little* and *Mini C*, whereas crystallised ability is more suited to *Pro* and *Big C*. Initially, Singh (2006) found no significant relationships between fluid thinking ability, crystallised thinking ability, and creativity. Following this, Batey et al., (2009) concluded that crystallised thinking ability was more closely related to divergent thinking fluency than fluid thinking ability. Similarly, Cho et al. (2010) suggested that 'the association between intelligence tests and creativity tests may be made because it is possible to use crystallized thinking ability as a resource for the mental operation of creativity' (p.134); however, Batey et al., (2010) found that fluid thinking ability predicted divergent thinking fluency better than crystallised thinking ability. Consequently, it is difficult to draw solid conclusions other than accepting that both fluid and crystallised thinking ability are implicated in 'creative thinking'.

The quality of crystallised and fluid thinking ability differs within a student cohort, high ability or not. Interestingly, previous research into disadvantaged high ability children, low socio-economic status students, and those in juvenile detention found fluid thinking ability to be prominent strengths of these students (Seeley, 2004, 1984; VanTassel-Baska et al., 2007). Further, they preferred real-world thinking and problem-solving situations that were open-ended and required ideational fluency and flexibility (VanTassel-Baska, 2018). As suggested above, there is a tendency for teachers to identify verbal thinking actions as key indicators of high ability; however, as Benbow and Minor (1990) showed, students may be gifted in multiple domains.

Ignorance of such differences has led to many programs excluding diverse high ability students (Kaufman, 2013). More specifically, general ability tests as a sole identification tool potentially exclude many students because their learning profile is misrepresented in the results. Specifically, if a student has weak scores in one domain, his or her total score will be dragged down (Sternberg, 2010a). This provides a rationale for assessing students' verbal and fluid thinking actions as part of their learning profile in conjunction with their creative thinking actions and non-cognitive abilities. Lohman et al. (2008) suggest that composite scores or general ability are overly simple representations of a student's thinking abilities.

It has been argued that the thinking actions discussed above, sequential, simultaneous, crystallised, and fluid, underpin patterns of actions involved in cognitive and behaviour engagement and are crucial for achievement within a regular classroom. What follows is a discussion of thinking actions involved in creative cognition.

2.5.4 Creative Thinking Actions

Traditional approaches to creative thinking proposed divergent and convergent thinking as the basic thinking actions involved in creativity. Most definitions of 'creativity' reduces it to two components, that is, as representing something different and new while also being appropriate to the task at hand (Sternberg et al., 2002; Sligh, Conners, & Roskos-Ewoldsen, 2005).

Moving beyond the dichotomy of divergent and convergent thinking, two additional thinking actions should be considered given Runco's (2005) definition of creative giftedness, which includes an exceptional interpretative capacity. These two types are critical thinking (Urban, 2002, 2003), and inferential thinking (Munro, 2003, 2005). Geake (2008) proposed that high ability students are more likely to use both divergent and convergent thinking

strategies spontaneously and selectively in a balanced way. Furthermore, Munro (2015) suggested these students have a strong ability to think inferentially and with discretion to synthesise their reflections into intuitive interpretations (Munro, 2015). These theories follow the consensus in creativity research which hold meaning-making and evaluation as crucial to the creative process (Lubart, 2001). Further to this, it should be mentioned that while these thinking actions are treated as different processes, it is too difficult to establish the extent to which they overlap functionally or structurally. Based on these considerations, four thinking actions will be described for their contribution to creative thinking: inferential thinking, divergent thinking, convergent thinking, and critical thinking.

2.5.5 Inferential Thinking Actions

Inferential thinking involves drawing together multiple pieces of information and generating ideas and conceptions not specified in the original stimulus information (Blank et al., 1978; Barrett, 1968). This thinking action involves the student to go beyond the information that is perceptually available and to draw on other episodic and semantic knowledge (van Kleeck et al., 2006).

Inferential thinking actions create meaning in response to the perception of material and symbolic affordances of an artefact. An example of this can be found in Munro's (2015) research where high ability students included concepts in their solutions that were not mentioned in scenario problem-solving tasks. Additional work in this area from Santoro (2016) found high ability students inferred new concepts from teaching situations, expressing these inferences in concept maps, with many going above and beyond the content taught. Further to this, Geake (2008) postulated that high ability students are more likely to use both divergent and convergent thinking strategies spontaneously and selectively in a balanced way, while Sembiante, Dynia, Kaderavek, and Justice (2018) found that students with developed

inferential thinking capacity are 'better able to make connections and understand the meaning of a book when engaging in reading' (p.15). It follows that inferential thinking uses available affordances to build models of the world and to generate possibilities based on perceived cues that indicate opportunities for action[18].

2.5.6 Divergent Thinking Actions

It has been suggested that divergent thinking may be a reliable indicator of creative potential (Runco & Acar, 2014). Such a suggestion is attractive for a number of reasons:

- It is a good metaphor of the kind of cognition that should lead to original ideas;
- It is easy to contrast with convergent thinking, which typically leads to conventional and ''correct'' ideas and solutions rather than original options; and
- It allows researchers to make reliable hypotheses (Runco & Acar, 2014, p.66).

This should be accepted with two important caveats however: creativity is not just divergent thinking (Dietrich, 2007), and tests of divergent thinking do not indicate the conditions necessary for future creative performance/achievement (Runco, 2012; Yoruk, 2014). Both points are discussed next.

Divergent thinking has been a popular concept in previous theories of creativity. Amabile (1996) refers *to divergent thinking* in her second component as what a person knows about how to think creatively. Cropley (2006) offered an extensive description of divergent thinking. For example, taking risks, being unconventional, and seeing new possibilities are typical of this type of thinking. Divergent thinking therefore involves resisting group pressure and changing a norm associated with a group (Amabile, 1996). Furthermore, divergent thinking involves seeing new perspectives, making links between previously unlinked ideas and feature,

[18] Doing so furnishes or elaborates ideas/instances/contexts to a greater extent. The elaboration is inferential while the number of possibilities is divergent. Both of these thinking actions complement each other and work in parallel.

as well as generating multiple answers to a question (Cropley, 2006). It is generally held that divergent thinking leads to new ways of seeing the problem or the world; it generates novel interpretations of the world.

Initial conceptions of divergent thinking tasks centred on unconstrained verbal and figural ideation (Kim, 2006; Torrance, 1962, 1968, 1972). Since the early measures introduced by Torrance, researchers have developed domain-specific tests to measure problem-finding/solving by using complex real-world issues (Munro, 2012; Scott et al., 2004; Treffinger & Isaksen, 2005). With this, more complex conceptions of creativity of arisen.

2.5.7 Convergent Thinking Actions

Urban (2003) proposed that creativity - being successful in finding creative solutions - requires a balance of general knowledge and divergent thinking. Similarly, Cropley (2006) describes convergent thinking as replicating orthodoxy in relation to making associations i.e. connecting actions-affordances-audience-artefact constraints. More specifically, it involves being logical, finding a single best answer, as well as attaining accuracy and correctness (Cropley, 2006). From this perspective, convergent thinking primes the mind to be prepared to perceive opportunities which are often present through chance. Cropley (2006) refers to this as having a *prepared mind*. In terms of this study, an engaged student's mind is prepared in a way that aligns with the cultural norms around interpretation of the material and symbolic affordances of their classroom.

Once the mind is primed and ready to perceive, the affordances will be acted on to create artefacts and affordances for the audience to act upon in turn. Using Becquerel as an example, Cropley argues Becquerel's prepared mind contains specific knowledge and specialised technical skills allowing him to notice something unusual. Conversely, Cropley argues that knowledge may hinder creativity, using the example of Semmer and his discovery of the

fungus *penicillium notatum*. Semmer was seemingly stuck in his orthodoxy, unable to see the cause of the horses' recovery. Cropley therefore argues that when divergent thinking is directed by knowledge of how to acquire, organise, and apply knowledge, effective novelty is likely to emerge. Convergent thinking essentially involves reproducing culturally acceptable patterns of action in response to specific affordances found in artefacts.

2.5.8 Critical Thinking Actions

Many have argued that divergent thinking unconstrained is less likely to lead to high quality creative artefacts (Cropley, 2006; Lubart, 2004; Sternberg, 1985). Creativity thus involvesa combination of divergent and convergent thinking while also demanding 'critical processes' that evaluate the results of divergent thinking actions and convergent actions, analysed for workability, acceptability, or effectiveness (Lonergan, 2004; Runco, 2003). Critical and convergent thinking actions evaluate progress of the artefact by analysing the how its features fit with expectations based on perception of the material and symbolic affordances.

Critical thinking involves the application of purposeful and reflective judgement when deliberating on what to future actions or their beliefs about the state of affairs (Galatis, 2013). Furthermore, critical thinking involves questioning assumptions, evaluating quality, looking for exceptions and anomalies, and thinking reflexively or in a 'meta' sense (Klein, 2011). Demasio, (2008) argued that

> 'Normal cognition and movement require organization of concurrent and interactive sequences. Where there is a need for order there is a need for decision, and where there is a need for decision there must be a criterion to make that decision' (pp.199-200).

According to Urban's componential theory of creativity (2005), the final stage of creative production requires the actor to think critically and to evaluate the creative outcome in order to achieve an appropriate balance between convergent and divergent thinking. Furthermore, Urban (2005) argued successful creative thinking occurs when a balance of general knowledge and divergent thinking is achieved. The aspects of thinking listed below are more general than divergent thinking; they resemble aspects of metacognitive thinking. They include:

- Encoding and storing knowledge in a flexible memory;
- Analysing;
- Thinking logically and convergently; and
- Thinking critically and evaluatively.

These critical/evaluative thinking actions can occur intuitively but also explicitly and in conjunction with convergent and divergent thinking actions. According to Gabora (2002), the creative process proceeds with an intuitive phase

> 'where each thought activates and potentially retrieves information from a large region containing many memory locations. Because of the distributed, content-addressable structure of memory, the diverse contents of these many locations merge to generate the next thought. Novel associations often result. As one focuses on an idea, the region searched and retrieved from narrows, such that the next thought is the product of fewer memory locations. This enables a shift from association-based to causation-based thinking, which facilitates the fine-tuning and manifestation of the creative work' (p.126).

This is echoed by Dietrich (2004) who argued that sophisticated creative behaviour is based on prefrontal integration of unconscious novel thoughts manifesting in consciousness (p.1005). Some students may be able to find problems yet unable to verbalise the reason or thought processes that lead to this conclusion.

Gabora (2010) suggests analytic thought requires a state of focused attention[19], while associative thought requires a state of de-focused attention (p.10). More recently, Kaufman (2009, 2011) proposed a dual-process theory of intelligence, defining intelligence as being able to manage switching between explicit and implicit modes of thought in response to contextual demands; hence creativity involves spontaneously shifting attention between analytical and associative modes in anticipation and in response to the environment. Moving past the traditional dichotomy of convergent and divergent thinking, artefacts emerge out of divergent thought, inferring associations and relations through salient features, and convergent thought, involving analytical processes of critical thinking and causality (Gabora, 2010).

2.6 Artefacts in a school context

As stated previously, according to the Five A's framework, creativity emerges as a form of action engaged in by various actors (individuals or groups) in relation to multiple audiences (individuals or groups), exploiting the affordances of the cultural (symbolic and material) world, and leading to the generation of artefacts (appreciated as new and useful by self and/or others). It is important to remember that all five dimensions are relational in nature: 'actors are defined by their interaction with audiences, action engages existing affordances and generates new ones, artefacts can become agents within creative work, etc.' (Glăveanu, 2014 p.36). From this perspective, artefacts are not the final product of a process: artefacts form

[19] Attention will be discussed in section 2.7.3

part of the process and the affordances of an artefact evolve with the cultures that interact with the artefact.

2.6.1 Artefacts in a classroom culture

Lubart (2003) asserted that cultural objects are a product of creativity. According to Cole (1996), culture involves developing and accumulating artefacts: 'the activities of prior generations are cumulated in the present' (p.144). From this sociocultural perspective, 'each creation comes into being, is understood, and is valued as part of a larger web of relations of people, things, institutions, and beliefs beyond that particular creation' (Weiner, 2000 p.254 as cited in Glăveanu 2014). Referring to classroom tasks as artefacts highlights the transactional and interactional nature of creation.

Accordingly, as argued in the affordances section above, artefacts hold latent cues for potential actions (Parchoma, 2014, p.364). Perception of these cues is cultural and the 'use of objects in creative action is most often not pre-defined but (re)constructed as work progresses' (Glăveanu, 2014, p. 54. However, when a student is creating an artefact in a formal setting, the interpretation of these cues is evaluated by the teacher and somewhat fixed. Glăveanu (2014) goes on to say that more needs to be known about 'the patterned ways in which people relate to cultural artefacts and distribute their action depending on aim and context' (p.53). A classroom task is a cultural artefact which aims to actualise the student's learning through prompting students to perform specific transactions and interactions: these performed actions depend on the student's beliefs about their audience and their perception of affordances in the artefact created by the teacher.

In recent work, de Bruin & Harris (2018) reported that many teachers labelled a student as 'engaged' when they were perceived as a '*busy* student who is concentrating on the set work' (p.18). Accordingly, these teachers indicated that an engaged student was one

who was ‘actively working on set tasks,’ visibly concentrating ‘with a clear focus on the task at hand,’ and ‘not distracted by others’ (p.18). This highlights how only certain relational patterns attached to artefacts are privileged/accepted, while the students acting according to these patterns are defined as ‘engaged’.

Echoing Vygotsky (1978), Glăveanu (2014) argues that ‘the use of cultural artefacts is first internalised by creators and later materialised in action’ (p.53). Issues arise when a classroom privileges certain forms of expression, that is, text-based expression as the dominant mode of participation. Literacy practices are thus important to consider when a student is unable to relate to and transact with the artefact through language/text as the teacher/audience expects. Performance/subject areas that privilege expressions of knowledge, skills, and attitudes in text-based artefacts may alienate some students because ‘difficulties in oral language, and in turn written language, have significant implications for adolescents’ school achievement and retention’ (Swain, 2017, p.41).

When the affordances in an artefact/task are presented in *text* form it becomes a ‘literacy event’ (Street & Martin-Jones, 2000, p.21). Literacy events involve reading and/or writing and contain underlying conventions and assumptions (Street & Martin-Jones, 2000). Success within a literacy event requires an understanding of the particular cultural ways of thinking about and performing reading and writing (Street & Martin-Jones, 2000). Kress (2000), for instance, use the example of a science classroom that uses diagrams, objects, and notation systems in addition to spoken and written language to teach 'science'; however, students doing an experiment or engaging in experiential type learning would still be required to communicate their learning as text in the form of a report as this is the culturally acceptable way of externalising knowledge and providing evidence of learning.

Accessing information in a text-based classroom tasks may be excessively difficult for some students, including those who are disengaged, due to their being unable to reconstruct the intended meaning based on the cues found in a classroom task. For many of these students, acquiring written language is overly difficult, contributing to poor academic performance (Roy et al., 2013). In best case situations, language deficits are identified in early literacy learning, albeit less commonly in low socio-economic status children (Bishop & McDonald, 2009; Snowling & Hulme, 2012). Further, most students with language disorders struggle academically, including those identified as high ability (Bishop & Adams, 1990; Munro, 2011; Young et al., 2002).

Participation in a classroom culture becomes even more difficult when a student is unable to utilise cultural thinking actions in the form of semantic and grammatical knowledge making them less likely to access relevant information in lessons (Nippold, 2002; Ravid & Tolchinsky, 2002). This occurs when a student is only exposed to colloquial oral language discourse, missing out on underlying conventions and cultural knowledge associated with formal texts and language use. Understanding decontextualised and codified linguistic cues of grammar and meaning are important for success in school (Ravid & Tolchinsky, 2002; Swain, 2017); students can only reinterpret the text as intended by the teacher if they have the cultural thinking patterns to do so.

2.6.2 Constraints on Artefacts

Artefacts are material and symbolic: they occupy space and hold cues for norms and institutional forms of behaviour. While 'cultural artefacts have the potential to shape action, they are not capable of determining it in a mechanistic way' (Glăveanu, 2014, p.22). Schools, like other institutions, are sustained by groups of people who legitimate the existence of such artefacts while also deciding which artefacts are acceptable. Importantly, each person who

comes into contact with artefacts 'participates in this construction of meaning by making aesthetic judgements' (Glăveanu, 2014, p.40). In subjects such as art, design, and technology, creativity is stimulated through a wide range of materials, tools, and other resources (Davies et al., 2013; Robson & Jaaniste, 2010). The challenge is to provide not only the material resources but also the symbolic affordances, in so far as the socio-cultural conditions allow for students to develop their creative ability.

As highlighted in the discussion above in relation to the teacher as audience, students as actors are sensitive to the social validation of their artefact by their audience. When a student creates an artefact, they respond to the perceived affordances of the task. Accordingly, Glăveanu (2014) argues that this process is part of the cultural life of an object, and that 'negotiating a place for new artefacts requires dialogue, cooperation and also divergence of opinion' (Glăveanu, 2014, p.54). This points to the importance of the teacher as audience moving past notions of the ideal/good student as a successful embodiment of formal schooling and 'one who most produces the appropriate forms of cultural display' (McLeod & Yates, 2006, p.51). Consequently, it is argued here that disengagement arises when a student is unable to produce the appropriate artefacts or because a student may not feel their artefacts are valued by the audience.

In a school setting, artefacts are outcomes of learning in subjects/performance areas, functioning as evidence of student understanding (Weinlein, 2019). Heacox (2012) argued that flexible and challenging classroom tasks are more likely to develop students' capacity. Models of giftedness such as the Developmental Model of Gifted and Talented[20] (DMGT) and the

[20] As defined in the Gagne (2000), 's progressively emerge from the transformation of these high aptitudes into the well-trained and systematically developed skills characteristic of a particular field of human activity or performance' (p.2). While Gagne (2000, 2010) refers to the environment in the DMGT, little detail is given on the types of objects that might lead to development of ability. Gagne (2013) does alter his position in later work on the DMGT 2.0, adding that 'environmental catalysts also play a significant role in fostering or hindering

Munich Model of Giftedness (MMG) see a natural ability develop within the eight performance areas listed below (Gagné, 2004; Heller, Perleth, & Lim, 2005).

- Natural sciences
- Mathematics
- Technology and Computer Science
- Humanities
- Arts (music, painting, fashion)
- Languages
- Athletics
- Social relationships

Each of the performance areas are related to 'fields' and each has distinct artefacts, affordances, audience perspectives, and actions. This means that a culture interprets an artefact in a particular way and for particular uses, a cricket bat as sports equipment in a cricket game as opposed to a weapon in a fight against a rabid dog, for instance. Consequently, artefacts are maintained through audience (cultural) participation (including moral values/normative principles) which influences the expected and accepted outcomes and actions in that given context/event. In the cricket bat example above, both uses would likely be accepted, and the use of the artefact would not be questioned. Issues would arise

the development of human aptitudes; and all three sub-components – Milieu, Individuals, and the environment manifest its significant impact in many different ways' (p.14). Furthermore, Gagne (2004) asserts that he takes a psycho-educational point of view because sociological interpretations are of limited usefulness (p.142). Wellisch (2016) criticises the DMGT for 'leaving out genuine environmental factors, and that its application relates specifically to gifted achievers' (p.18). Gagne fails to see that 'before the product is introduced to the social arena, the creator is the first to experience and evaluate it by trying to see it through the eyes of other people' (Glăveanu, 2014, p. 36). The students will not show their ability if they think the person/audience 'evaluating' their artefacts holds no legitimacy. This point is also discussed in relation to identity and motivation below.

for the actor who used the bat or a shield in a fight with a fellow classmate. The audience (teachers) would condemn the student for using the cricket bat/artefact inappropriately if the latter occurred, that is, the actor's interpretation of the cricket bat's affordances would have been contrary to the audience's expectations. If it were a scene in a play about bullying, then the actions would take on a completely different meaning.

Further to this, recognition of an artefact as evidence of ability in any of these performance areas highlights the cultured embodiment of ability. Success in any of these areas involves the actor to act according to the expected affordances of the target artefact. Running a kilometre in 2:15mins would make you a world champion in the right circumstances but running at this pace while the police pursue you on foot could lead to jail time for resisting arrest. The same can be said for graffiti. Aside from the legal and moral considerations associated with graffiti, this form of expression is akin to calligraphy due to the high skill level required. These examples illustrate the importance of considering values, especially when viewing an artefact. This is significant because delinquents and school dropouts maintain a non-dominant value system that leads to the application of their actions in alternative performance areas (Kelly & Veldman, 1964). A disengaged student may not have had appropriate opportunities to practice being engaged or creative in formal classroom environments.

It is clear that objects are often created with an intended purpose and pattern of use, but this is not always the case. Glăveanu (2014) argues that this is true for all objects 'within the patterned ecology of human culture' (p.54). Further, any time a person is creative they make 'reference to an existing pattern' (Csikszentmihalyi 1999, p.314). A classroom task that leads to a new artefact may allow for some flexibility; however, 'negotiating a place for new artefacts requires dialogue, cooperation, and also divergence of opinion' (Glăveanu 2014,

p.54). Narrow conceptions of creative ability make these negotiations unfruitful or non-existent. The teacher creates a task/artefact with the belief that the task will elicit specific patterns of actions when the student responds to the affordances. The teacher becomes the audience who judges the students' response to the task/artefact. The students are evaluated on how well they respond to the cues in the task. What follows is a review of literature that describe the student as an actor with individual characteristics.

2.7 Actors: Student as Actor

Glăveanu describes the creativity complex using the Five A's as a 'dynamic configuration of actors, audiences, actions, artefacts, and affordances within the changing boundaries of any given creative activity' (Glăveanu, 2015, p.327). This section will review current literature relating to individual learning characteristics to develop the idea of the student as actor: the student is embedded in a field of social relations within their school culture. The student as actor conceptualises the engaged student as a social construct resulting from their interactions and transactions with their teachers (audience) as well as the affordances and artefacts in their school. It has been argued in the introduction that development of creative ability must first start with engaging a student by supporting their connection with the affordances, audience, and artefacts in their classroom. The fifth dimension of the Five A's framework – the actor – will now be unpacked. Motivation will be examined, followed by identity, self-efficacy, attention, and schizotypy.

2.7.1 Motivation

Sternberg's investment theory of creativity proposed that highly creative work emerges out of the 'confluence of six distinct but interrelated resources: intellectual abilities, knowledge, styles of thinking, personality, motivation, and environment' (Sternberg, 2006, p.88). Liem and Chong (2017) defined motivation as 'individuals' energy and drive to learn,

work effectively, and achieve to their potential, and engagement as the behaviours aligned with this energy and drive' (p.3). Newmann (1992) argued that engaged students make a 'psychological investment in learning. These students take pride not simply in earning the formal indicators of success (grades for example), but in understanding the material and incorporating or internalizing it in their lives' (p.1). On the other hand, Saeed and Zyngier (2012) found that while disengaged students may still submit work/complete tasks, it is frequently executed with little interest or commitment.

Early research into academic success showed that greater student effort and attention in grades one to three were likely to lead to higher achievement in fourth grade (Finn & Cox, 1992). With the momentum of success in primary school, that is, the actor's appropriate engagement (actions) with the affordances and audience to produce the required artefacts, a student is more likely to achieve in the later years of school (Alexander et al., 1997). Building on this, Barab and Plucker (2002) argue that expressing one's ideas involves an individual transformation of intention and attention. Specifically, Barab and Plucker (2002) hold that

> Intention refers to the goals or motives of the individual and attention refers to the immediate situational (material and social) processes and structures to which the individual attends—again, neither intention nor attention resides solely within the individual (p.174).

Student 'engagement' comes to represent the alignment of the actor's intentions and transformative interactions and transactions (actions) with the audience, affordances, and artefacts (environment). Effort is thus crucial for achievement in school, and it is underpinned by motivation but also depends on opportunities to participate within the classroom culture.

As noted earlier, enjoyment, effort, and curiosity are crucial for engagement (Watt et al., 2017). Furthermore, it has been long held that motivation in creative engagement is of high importance (Amabile, 1985; Forgeard & Mecklenburg, 2013; Runco, 2005a). Significant investigations into the role of environmental and social factors in creativity have highlighted the importance of motivation (Amabile,1983; Csikszentmihalyi; 1999). As discussed above, Amabile's (1983, 1996) componential framework of creativity[21] combined cognitive and social-psychological approaches with specific reference to task motivation. Motivation is also prominent in Renzulli's (2010) work where it is recognised that some students will not commit to a task that is irrelevant or inappropriate. Renzulli's (1986) Revolving Door Identification Model has attempted to overcome some of the assumptions around ability by providing above-average students with opportunities and positive feedback to develop their abilities (Renzulli, 1986). According to Renzulli, (1984)

> The Revolving Door Identification Model differs from traditional programming practices both in the larger segment of the population identified for participation in the gifted program and in its emphasis not on giftedness as a static characteristic, but on the development of gifted behaviours in certain people ... at certain times ... under certain circumstances (p.164)

The Revolving Door Identification Model acknowledges that, with appropriate provision, disengaged and underachieving students can develop into high performing students in academic and non-academic endeavours. A student can thus be high ability yet disengaged.

[21] (a) domain-relevant skills, (b) creativity-relevant skills, and (c) task motivation

In early work, Amabile (1983) showed that high ability students excel at problem-solving, decision-making, and deploying cognitive and metacognitive strategies when completing tasks involving idea generation, insight, divergent thinking, and selective combination. These students had high levels of focus and task commitment as well as high intrinsic motivation. Intrinsic motivation (mastery goals) refers to learning for personal interest and gain (Dweck, 2000). It can lead to higher creativity in students since the judgement of others can thwart creative performance (also known as mastery goals) (Amabile, 1985, 1996). Interestingly, this type of motivation can be impaired by parent and teacher practices (Ryan, Stiller, & Lynch, 1994). On the other hand, extrinsic motivation (performance goals) refers to circumstances where the individual is motivated by their desire for high grades, for social acceptance, or by their competitiveness with others (Ryan & Deci, 2000).

Arguing for a more nuanced framework of motivation, Forgeard and Mecklenburg (2013) investigated the bi-directional nature of the interactions between creators and others. In their study, Forgeard and Mecklenburg adopt a two-dimensional framework that differentiates between the locus of motivation from the intended beneficiaries of the creative process and outcomes. They propose that each dimension, intrinsic and extrinsic, contains four motivational orientations: *growth*, *gain*, *guidance*, and *giving*. *Growth* refers to personal benefits arising out of the creative process; *gain* refers to an extrinsic and self-oriented focus on external reward as the outcome of the creative work; *guidance* refers to an intrinsic and other-oriented focus on benefits for others afforded by the creative process itself; and *giving* refers to an extrinsic and other-oriented focus on benefits for other people which constitute the external outcomes of the process (p.258).

The goals of a person underpin their actions (Ziegler, 2005). Being appropriately creative in a classroom thus requires intention and attention connect with the audience,

affordances, and artefacts via goal-driven action. According to Ziegler (2013), goals are 'targeted conditions of the physical or the social environment by the individual through actions' (p.4). Once a goal is reached, the individual's capacity to act evolves through the development of the individual's subjective action space, action repertoire, and goals; effective action alternatives are applied when adapting to the environment (Ziegler, 2013). Consequently, the individual's perception of world differs and so does their capacity to respond to affordances in the future.

If students are to be successful in school, their actions must be directed by goals that have been approved by the audience/teacher and correspond to expectations around the use of artefacts. This implies that their telic capital differs from an engaged student. Telic learning capital is 'the totality of a person's anticipated goal states that offer possibilities for satisfying their needs' (Ziegler & Baker, 2013, p.30). Ziegler and Baker (2013) argue that alienated students 'may have very few or, in extreme cases, no learning objectives' (p.35). These *disengaged* students' telic and attentional capital would differ greatly. While it can be argued that they do in fact have learning goals, it just happens that these learning goals are outside the classroom or are informal. These students may be more driven by their own goals, that is, they are intrinsically motivated. This implies that they are more self-programming than externally programmed by their teachers/audience. Given this, the affordances found in a regular classroom may not fit with the student's informal or non-academic learning goals, leading to the intrinsically motivated student feeling alienated and devalued.

2.7.2 Self-efficacy

Self-efficacy is multidimensional[22] and specifically refers to a person's beliefs about the effectiveness of their skills in a given situation (Zimmerman, 2000). Bandura (1986) describes self-efficacy as a person's evaluation of 'their capabilities to organise and execute courses of action required to attain designated types of performances' (p. 391). Interestingly, disengaged students often have lower self-efficacy (Morrison & Allen, 2007).

Self-efficacy among high ability students is strongly associated with increases in motivation and achievement (Gentry et al., 2011; Siegle et al., 2014). Additionally, Ziegler (2005) proposes that the development of self-efficacy through realistic/veridical assessments of ability are essential for achieving excellence. Further to this, Bandura (1997) recognised the crucial role of self-efficacy in creativity. Extending Bandura's definition (1986), Tierney and Farmer (2002) define creative self-efficacy as 'the belief that one has the ability to produce creative outcomes' (p.1138). Using this conceptualisation, many studies have shown that creative ability requires creative self-efficacy for creative performance making it instrumental in developing and demonstrating creative ability (Beghetto, 2006; Hammond, 2011; Lassig, 2009; Tierney, 2002; Jaussi et al., 2007).

A substantial amount of research on creative self-efficacy investigates the work environments of adults (DiLiello, 2010; Jaussi et al., 2007; Tierney & Farmer, 2002, 2004) or in university settings (Choi, 2004; Lemons, 2005). Tierney and Farmer's (2004) seminal study showed creative self-efficacy was a stronger predictor of creative performance than job self-efficacy. Beghetto (2006) found that high levels of creative self-efficacy were negatively

[22] Zimmerman (2000) explains that 'The level of self-efficacy refers to its dependence on the difficulty of a particular task, such as spelling words of increasing difficulty; generality pertains to the transferability of self-efficacy beliefs across activities, such as from algebra to statistics; strength of perceived efficacy is measured by the amount of one's certainty about performing a given task' (p.83).

associated with feeling that teachers listen to them. On the other hand, a positive association was found between high levels of creative self-efficacy and feeling that teachers had given up on them. Beghetto (2006) theorises that these dissatisfying experiences may motivate students to practice their creativity to outperform others.

That said, Beghetto (2006) also found a significant association between teacher feedback and creative self-efficacy: 'teachers can boost students' creative self-efficacy by providing supportive feedback' (p.454). Furthermore, Tan, Li, and Rotgans (2011) found that creative self-efficacy was positively correlated with momentary affect and mastery goal-orientation (p.92). More recently, Karwowski (2017) showed that 'creative self-efficacy correlated strongly with a tendency to seek out new experiences and an acceptance of unpredictability' (p.547). consequently, some students may turn away from their classroom culture, finding another place that suits their interests and requires less feedback from teachers while also holding teacher feedback in low regard.

2.7.3 Attention and Perception

For all students, the ability to direct attention, monitor, plan, and evaluate strategies[23] is essential for creativity (Armbruster, 1989). The quality of attention and concentration is a reliable predictor of later achievement (Vladut et al., 2013). Ziegler and colleagues describe this as 'attentional learning capital', that is, 'the quantitative and qualitative attentional resources that a person can apply to learning' (Ziegler & Baker, 2013, p.31). Renzulli's three-ring conception of giftedness names task commitment, which necessitates attentional control,

[23] There are two types of thinking strategies: cognitive and metacognitive(Bruning et al., 2011). Cognitive strategies refer to how learners act on their ideas (that is, inferring, making links, visualising, organising what you know, self-questioning) (Munro, 2003). On the other hand, metacognitive strategies refer to the management of these cognitive strategies (that is, thinking about thinking). This involves planning, monitoring, evaluating, and revising cognitive strategies (Schunk & Zimmerman, 2012).

as an essential characteristic of above-average ability (2005). More specifically, a student's capacity to focus and commit to goals is essential for success in school and life (Renzulli, 2010).

Being able to generate and sustain a train of thought, an ability necessary for academic success, relies on cooperation between the Executive Attentional Network (EAN) and the Default Mode Network (DMN) (Christoff et al., 2009; Smallwood et al., 2012). The default mode network facilitates the generation of imagery while visualising and daydreaming (Barrett & Satpute, 2013; Bressler & Menon, 2010); it has been called the 'imagination' network by some researchers (Kaufman, 2013).

Work in this area has shown the EAN and the DMN tend to be anti-correlated (Fox et al., 2005). Accordingly, Baars (1993) argued that people are required every day to filter out certain pieces of information and privilege others. This may be more difficult for students with attention deficit hyperactivity disorder due to increased neural noise between signals originating from a periphery that is more diverse and more difficult for their EAN to focus on for prolonged periods of time (Hearne et al. 2019). Handy et al. (2015), however, showed that the EAN can work with the DMN to maintain an inner train of thought on associations and ideas emerging from episodic memory, with training.

Interestingly, many highly creative students daydream and appear to be off-task or absent-minded because they have a rich fantasy life, with the ability to use imagery and visualisation to a high level (Daniels & Piechowski, 2009; Davis, 1999). Seminal work in the area from Singer (1966) argued that daydreaming, imagination, and fantasy are crucial for maintaining a healthy mind. Furthermore, Singer showed important links between daydreaming frequency, creativity, storytelling activity, personality, divergent thought, planning, problem-solving, associational fluency, curiosity, attention, distractibility, social skills, boredom, and interpersonal curiosity (McMillian et al., 2013, p.3). These links further

established opportunities for rehearsal and constructive planning, and for providing an ongoing source of pleasure (Kaufman & Singer, 2011).

According to Buckner et al., (2008), the DMN assists with future behaviour by using prior experience to form future-oriented strategies when not engaged externally, as well as by using past experience to generate ideas. D'Argembeau et al. (2010) reported stronger activation in the ventral medial prefrontal cortex (VMPC) and the posterior cingulate cortex (PCC) when imagining personal future events compared to non-personal future events. These areas are both key hubs within the DMN and influence attentional shifts. Attention-demanding tasks thus rely on the Executive Attention Network (EAN) being able to suppress the DMN to turn attention outward. This is evidenced by brain imaging that shows the DMN is normally associated with stimulus-independent thought and self-reflection (Whitfield-Gabrieli & Ford, 2012). Exogenous attention-demanding tasks may be difficult for many students, causing them to miss out both on instructions from teachers and other environmental cues for action.

Ziegler and colleagues recognised the importance of prior experience for achieving excellence, conceptualising it as telic and actional capital (2013). They assert that 'episodic learning capital concerns the simultaneous goal- and situation-relevant action patterns that are accessible to a person' (Ziegler & Baker, 2013, p.31) and explain 'actional learning capital as the action repertoire of a person – the totality of actions they are capable of performing' (p.30). According to Vladut et al. (2013), episodic learning capital differs from actional capital since the latter is only concerned with executable actions, whereas episodic learning capital comprises of one's ability to make effective use of their action repertoire by using prior experience. This is similar to Sternberg's (1985) notion of 'practical intelligence'. He refers to this capacity as adaptation (changing oneself), shaping (changing the environment), and

selection. Practical intelligence is informed by creative and analytical intelligence which is employed to judge what will be best to change or adapt. This intelligence applies solutions in the world the individual experiences (Sternberg, 2010).

Making use of prior experience is important since evidence suggests that neural processes supporting episodic memory—the retrieval of elements of prior experiences—may also be involved in divergent thinking (Madore, 2017). Furthermore, Simmons et al. (2008) hypothesised that temporal cortices are involved in more complex long-term memory representations such as spatial context, episodic memory, and emotions (as cited in Yoruk & Runco, (2014, p.11). This aligns with the Benedek et al. (2014) study that showed new and old idea generation is affected by episodic memory. Being able to use experience is vital for adapting to novel situations and problem solving.

2.7.4 Identity

Identity, conformity, and socialisation are important aspects of engagement as well as the creative process. Keeping in mind that identity is both dispositional (Feist, 1998) and contextual (Hennessey, 2003), self-categorisation is a nuanced and dynamic process in the socialisation of students. Whether a student sees themselves as part of their classroom has serious implications for the development of their creativity with that culture. Haslam et al. (2013) showed the role of identity in creative expression and evaluation, asserting that when personal identity is more salient, an individual's creations will reflect the person's beliefs, resulting in creative artefacts that are more about oneself than others.

Extensive research has shown highly creative students often prefer spending time alone (Ochse, 1993), pursuing their own interests, and possibly seeking unusual occupations because they are not interested in societal conventions (Albert, 1994). On the other hand, when social identity is salient, being connected to a group will most likely lead to creating

work that aligns with that group's norms while also labelling the creative work of that group as more creative (Adarves-Yorno et al., 2006). Consequently, even though using artefacts and affordances in an abnormal/unusual way can lead to new creative artefacts, if this usage is overly divergent according to the audience/teacher, tensions can arise because individual creativity needs to be appreciated by a group and conform to that group's values (Paletz & Schunn, 2010).

It is important to remember that creativity inherently challenges a norm, and thus makes the appreciation of creativity an understanding that some norm has changed (Amabile, 1996). Pressure to conform is a powerful mechanism for the regulation of cognition and behaviour since perceived expectations affect creative endeavours (Haslam et al., 2013). Identity salience can thus affect how students express their knowledge in the classroom and affect their motivation to be creative (Forgeard & Mecklenburg, 2013). Identify beliefs also affect self-efficacy and how students/actors receive/interpret feedback about their artefacts from their audience through ability-related feedback (Bandura, 1997; Tierney & Farmer, 2002).

Socialisation and conformity have received relatively little attention when compared to cognition in previous research on engagement and creativity. Urban (1991) argued that resisting group pressure, maintaining nonconformist behaviour, and autonomy of thinking are important for creative thinking. As discussed earlier, these traits may be detrimental in classrooms that emphasise external motivators such as grades but also where teachers seek to reward conformist behaviour. Therefore, when a student is not sufficiently socialised in comparison to expectation in terms of the culture of their classroom, and their identity beliefs about their own relational status positions them outside the culture, they may become marginalised. Marginalisation occurs due to race or ethnicity, socio-economic status (SES), and

religion or spirituality. The SES of a family, for example, may affect an individual's emotional wellbeing due to limited parental availability (Albert, 1994; Olszewski-Kubilius, 2000). Furthermore, marginalisation can lead to unconventional behaviour since those in the marginalised group are not socialised in the norms and practices of the in-group, meaning they are less likely to accept societal conventions and traditional routes to success (Albert & Colangelo, 1994; Ogbu, 1992).

Galang (2010) argued that creative people may be less trainable and less sociable due to inefficient learning of associations related to moral and social norms, that is, latent inhibition discrimination among stimuli is both difficult and less likely; therefore, 'low latent inhibition could impair adjustment to social norms' (p 6.). Latent inhibition (LI) refers to 'a retardation in learning about a stimulus that has been rendered familiar by non-reinforced pre-exposure, relative to a non-pre-exposed stimulus' (Granger et al., 2016 p.1). Low LI is also significantly linked with attentional deficits and distracted behaviours such as general inattentiveness, absent-mindedness, or the offering of non-sequiturs (Prabhakaran et al., 2013) as well as with creativity, primary process cognition (automatised cognition), extraversion, schizotypy[24], and psychoticism (Aguilar-Alonso, 1996; Burch et al., 2006; Eysenck, 1997; Galang, 2010; Gray et al., 2002; Martindale & Dailey, 1996; McMillan et al., 2013; O'Reilly et al., 2001). These students relate to the world in a very different to what might normally be expected.

Galang (2010) follows Lubow and Gewritz (1995) by proposing that attenuated levels of LI likely lead to 'peculiar ideation' (p.6). These students thinking actions are likely

[24] OLIFE - Schizotypal personality traits: Cognitive Disorganisation, Impulsive Nonconformity, Unusual Perceptual Experiences/Magical Thinking (Burch, Hemsley, Pavelis, & Corr, 2006; Gray, Fernandez, Williams, Ruddle, & Snowden, 2002; McMillan, Kaufman, & Singer, 2013) as well as over-inclusive thinking and broad associative horizons (Eysenck, 1997; Galang, 2010)

qualitatively different in how they manifest. This proposition is reinforced by Gray's (2002) research investigating the link between schizotypy and LI. They found 'LI is reduced by the schizotypal dimensions of unusual experiences and impulsive non-conformity' (p.281) with the unusual experiences dimension accounting for most of the variance. Crucially, however, Batey & Furnham (2008) found patterns of brain activation during creative thinking were similar to that of those scoring high in schizotypy and highly creative participants. This indicates overlapping mental processes in creative thinking and proneness to schizotypy. Interestingly,

> 'while deliberate searches for insights are instigated by circuits in the prefrontal cortex and thus tend to be structured, rational, and conforming to internalised values and belief systems, spontaneous insights occur when the attentional system does not actively select the content of consciousness, allowing unconscious thoughts that are comparatively more random, unfiltered, and bizarre to be represented in working memory (Dietrich, 2004 p.6)'.

Attention focus is thus crucial for engagement as well as creativity and is mediated by working memory and the ability of the EAN to supress the DMN (Benedek et al., 2014; Swerdlow et al., 2003). Finally, attentional focus is mediated by the level to which a student has internalised the actions and perceptual norms of their classroom culture.

2.7.5 Schizotypy

Indicators of schizotypy may help to understand students' ability to suppress distractions when completing tasks in class, and to understand a student's capacity to be socialised by the classroom culture. Two types of schizotypal traits are postulated in the

literature: positive and negative (Mason & Claridge, 2006). 'Positive' schizotypy consists of unusual perceptual experiences, magical beliefs, and impulsive nonconformity representing a 'positive semiology of psychosis' (Mason & Claridge, 2006 p.204). The *unusual perceptual experiences/magical thinking* construct relates to unusual perceptions, magical thinking, and illusions, and is highly correlated to openness to experience (Furnham et al., 2009). The *impulsive nonconformity* construct represents impulsiveness and forms of anti-social and eccentric behaviour (Mason & Claridge, 2006). Brinthaupt (2019) provides strong support that positive and disorganised schizotypy factors are capable of positively and significantly correlating with self-talk factors.

On the other hand, 'negative' schizotypy is characterised by cognitive disorganisation and introvertive anhedonia. *Cognitive disorganisation*, a 'negative' schizotypal trait, relates to issues with attentional control, lack of decision-making power, and social anxiety/impairment (Mason & Claridge, 2006; Venables & Rector, 2000). The final construct, *introvertive anhedonia*, relates to the inability to gain pleasure from normally pleasurable experiences; however, it has not been shown to be of significance in creative thinking[25] (Batey, 2012; Batey & Furnham, 2008; Furnham & Bachtiar, 2008).

As cited above, recent research has shown overlap between creative, schizotypal personality traits[26] and socialisation (Fink et al., 2014; Galang, 2010). Further, similarities between creative cognition and psychosis (Benedek et al., 2014; Fink et al., 2014) and a link between creativity and schizotypal personality traits have been shown in a number of studies

[25] During creative cognition, an association between the originality component of creativity and reduced de-activation of the right parietal brain region was found. Brain activity patterns were similar for originality and schizotypy during creative ideation. This is consistent with the idea that highly creative individuals may experience more stimuli than less creative individuals. (Benedek, Jauk, Sommer, Arendasy, & Neubauer, 2014).
[26] Schizotypal personality traits: Cognitive Disorganisation, Impulsive Nonconformity, Unusual Perceptual Experiences/Magical Thinking (Burch et al., 2006; Gray et al., 2002; McMillan et al., 2013) as well as over-inclusive thinking and broad associative horizons (Eysenck, 1997; Galang, 2010)

(Acar, et al., 2014; Batey et al., 2010; Furnham, et al., 2009; Yoruk & Runco, 2014). As mentioned in the previous section, patterns of brain activation of those scoring high in schizotypy were similar to the highly creative participants.

Batey and Furnham (2008) showed a significant relationship between the unusual experiences and impulsive nonconformity dimensions of schizotypy to self-ratings of creativity, creative personality, and everyday creative achievement. The significance of this research lies in the conclusion that many highly creative individuals may not be easily socialised and are non-conformists. Jacquet et al. (2020) recently showed that imagery and incubation were strongly associated with a positive schizotypy cluster when compared to negative schizotypy or low schizotypy clusters. Furthermore, 'brainstorming, idea manipulation, imagery, and incubation were higher in the positive schizotypy group when compared with negative schizotypy groups' (Jacquet et al., 2020, p.142). There is good evidence showing that schizotypy is strongly related to the creative process. This has important implications for creativity as well as understanding disengaged students' creative engagement in regular classrooms.

2.8 Chapter summary and Hypotheses

Current research on engagement, creativity, and wellbeing, has been reviewed and interpreted from the perspective of the Five A's framework. Firstly, it was argued that a Teacher functions as the Audience and gatekeeper of creative expression in their classroom. The importance of socio-cultural relations between teacher and student were shown to be crucial for the expression of creativity. Secondly, affordances were discussed in terms of the relationship between perception and opportunities for creative expression in classrooms. It was argued that engagement and the development of creative ability are linked to a student's perception of affordances in their classroom. These perceptions are co-determined through

previous individual-environment interactions with disengagement occurring when there is a mismatch between student and teacher see different opportunities for action. Thirdly, types of thinking actions relating to engagement with affordances in a classroom environment are examined. It was argued that these actions are critical for accessing cultural information in classrooms as well as expressing creative thinking in culturally acceptable artefacts. Fourthly, artefacts were described as holding latent cues for potential actions in the form of affordances, and the role of culture in determining the perception of these action cues. Engaging with a task thus means replicating culturally determined patterned actions when responding to the intended affordances based on material and symbolic cues of the artefact. Finally, the actor dimension was unpacked with the student as actor acting on the artefacts and perceived affordances as supplied by the teacher as audience.

As discussed in chapter 1, factors associated with disengagement are varied and complex. Students disengage for many reasons, some linked to personal circumstances (Bow, 1988; Kim, 2012) such as family and home (Colangelo & Dettman, 1983; Rimm & Lowe, 1988; Siegle & McCoach, 2009), school and curricula (Pohl, 2014; Renzulli, 2000), and a mismatch between students' learning capacity and classroom learning (Redding, 1989; Munro, 2011; VanTassel-Baska, 2018).

Being recognised as engaged or creative in a classroom involves being evaluated by the teacher according to the teacher's values and beliefs about what an 'engaged' or 'creative' student looks like. Disengaged students are often overlooked if they do not exhibit learning profiles typical of high achieving students (Betts 1988, Kim & VanTassel-Baska 2010). This valuation will determine subsequent opportunities to practice being creative. Glăveanu's description of creative action acknowledges that creativity occurs precisely when a person is able to 'move' (imaginatively and/or practically) from this conventional perspective to

alternative ones (students start from vastly differing alternative perspectives in the classroom, some closer to the convention than others) (Glăveanu, 2015, p.122). This point is important consideration for the current study because it may be the case that a disengaged student is unable to take on the (conventional) teacher's perspective when producing artefacts in a formal classroom setting. Understanding social relations is essential when researching creativity in formal situations (Glăveanu et al., 2020).

As discussed early in this chapter, some students differ in how they perceive cues, exploit affordances, and generate artefacts in formal school settings. Importantly, teachers set the culture of classrooms through their decisions about pedagogy and curriculum. The teacher functions as a formal 'audience' or gatekeeper in the classroom, managing the interactions and transactions between students (actors) by offering opportunities (affordances) for knowledge expression, legitimising creative actions and artefacts, and evaluating knowledge transactions.

The hypotheses arise from the literature presented in this chapter. The three hypotheses are as follows:

2.8.1 Hypothesis 1 - Classroom Engaged students (CE) differ from Classroom Disengaged students (CD) and School Disengaged students (SD) in the following ways: specific Thinking Actions[27] (Academic and Creative Actions) and their perceptions of Actor, Audiences, and Affordances.

This hypothesis limits the scope of the inquiry to differences between dis/engaged students to better understand how specific characteristics affect perception of material and symbolic affordances in their classroom culture and the types of thinking students use to engagement

[27] As discussed in section 2.5

artefacts in their classroom. The explanatory force of this hypothesis rests on examining correlations between elements of the Five A's model for an in-depth description of the total cohort in terms of their learning profile.

2.8.2 Hypothesis 2 - For High Ability students, High Ability Engaged Students differ from High Ability Disengaged students and Average Ability students in the following ways: specific Thinking Actions[28] (Academic and Creative Actions) and their perception of Actor, Audiences, and Affordances.

The second hypothesis further constrains the constructs outlined in chapter two with the purpose of responding to the clear problem of underachieving and disengaged high ability students in secondary schools. High ability disengaged students excel in some domains and not in others. This hypothesis investigates similarities and differences between dis/engaged high ability students' learning profile.

2.8.3 Hypothesis 3 – Particular combinations of Cognitive Actions, Actor, Affordances, and Audience factors are more likely to lead to higher displays of Creative Actions

The final hypothesis investigates which set/s of variables is/are most likely to lead to displays of creativity in regular classrooms and the multiple pathways to creative artefacts. This hypothesis examines which cognitive and non-cognitive variables are most likely to predict creative outcomes in a secondary classroom.

Students withdraw their investment in formal education and leave school early when they are unable to engage with their classroom tasks and connect with teachers, peers, or school. The next chapter discusses the issue to be investigated in this current study and the rationale for the conceptual framework.

[28] As discussed in section 2.5

Chapter 3

The Current Study

In the previous chapter, relevant theories and models of engagement and creativity were interpreted through the Five A's framework. Reconceptualising previous literature through the Five A's framework has provided a starting point for investigating the hypotheses described in the previous chapter. A review of current literature through the Five A's showed that traditional approaches to identifying ability exclude students who are unable to show they ability in culturally acceptable ways. This is especially true for highly ability students. Narrow conceptions of ability have led to misunderstanding of the reasons behind student disengagement from regular classroom programs, revealing a gap in current knowledge about how these students express their knowledge and creativity. The review showed that engagement within classroom is a multidimensional phenomenon involving the replication of certain cultural patterns of behaviour. It was also argued that disengagement results from a mismatch between the student's actions in response to the affordances, artefacts, and audience. This chapter describes the rationale for the conceptual framework used to investigate the issue outlined above.

3.1 Background to the Conceptual Framework and Rationale

The current problem is that some highly ability students are disengaging in regular classrooms, and, because of the limited opportunities for the development of their creative ability in these classrooms, these disengaged students seek alternative contexts to practice their creativity. Consequently, understanding how students perceive themselves, their audience, and their affordances in their classroom will increase the likelihood of re-engaging students who have become disengaged.

In Australia, while Gagne's model (2003) has been widely utilised, it has not served underachievers well because it ignores genuine environmental factors and therefore applies only to exceptional achievers (Wellisch, 2016). Gagne (2013) has given less weight to environmental explanations as he sees his position as a politically correct approach to dealing with human development. Wellisch (2016) argues that Gagne offers a 'compartmentalised view that biology and behaviour are the main building blocks of gifts and talents, unrelated to early attachment and other environmental effects on socio-emotional development, leaving the DMGT and EMTD without a component to address non-educational issues that create barriers to learning and achievement' (p.24). Considering the issues highlighted above, moving on from Gagne's model is imperative.

Some students are highly creative and may struggle in some classrooms (Kim & VanTassel-Baska, 2010). These students are more likely to find problems, be critical, or feel discontent with the status quo. These individuals tend to see exceptions and possibilities, to daydream and appear to be off-task, be playful with ideas and concepts, have bizarre beliefs and sometimes conflicting opinions, and be independent, intuitive, idiosyncratic, or unmotivated by grades. Compounding these factors, Seeley (1984) showed that creative students may receive lower grades even though they are stronger in fluid thinking actions and demonstrate quick perceptiveness (Seeley, 1984). Furthermore, teachers often prefer conformist students with highly creative students being negatively correlated with teacher's favourite students (Westby & Dawson, 1995). Unfortunately for these students, achievement in a text-based classroom demands thinking actions they are not yet able to perform. If a classroom culture is not actively challenging or able to facilitate the student's questions about content and classroom practice, behavioural problems will emerge as students become disengaged (Finn & Rock, 1997).

The literature paints a picture of the 'typical' disengaged student as being male (Espelage et al., 2003; Arbuckle & Little, 2004; Beaman et al., 2007), in the early years of secondary school (Marks, 2000), and from a low socio-economic status (SES) background (Sullivan et al., 2014). A more nuanced view is required as this type of characterisation fosters a deficit thinking explanation, one that blames the individuals for their behaviour instead of looking at the culture of the classroom in terms of the audience, affordances, and artefacts offered. When an individual is seen as the sole cause of their disengagement, a more nuanced understanding of disengagement becomes difficult and limited to easily observable and reportable problems. Moving to a relational model such as the Five A's supports a new way of thinking about dis/engagement.

Disengaged students may struggle to participate in classroom cultures that privilege verbal/written forms of knowledge in regular classrooms. It is important to note that many disengaged high ability students struggle in the verbal domain (VanTassel-Baska, 2018). Munro (2011) called for effective identification procedures to 'identify these students so that given appropriate differentiated educational opportunities they will learn and achieve optimally' (p.25). Sternberg (1997) argues that traditional methods focus on conventional ability and achievement tests, highlighting and validating only stored factual knowledge and superficial analysis of information. This creates self-fulfilling prophecies by not giving those who do not test well opportunities to succeed and share their knowledge. Munro (2011) echoes these views given such tests tend to suit white middle-class conceptions of ability. Furthermore, Ford, Orantham, and Whiting (2008) argue that marginalised high ability students may not answer questions on formal assessments solely for the purpose of displaying their knowledge. Accordingly, traditional intelligence tests are culturally loaded, seeming

artificial and inauthentic to such students (Ford, Orantham, & Whiting, 2008). This points to the need for useful identification tools to be available to teachers not just psychologists.

Schools are socially and materially situated; this 'situatedness' influences the actions performed by students (actors) when creating appropriate artefacts based on perceived affordances of the task. Opportunities to be creative may thus favour students with cultural knowledge pertaining to formal schooling. Students may be seen as creative in a formal school culture if they perceive, exploit, and 'generate' novel affordances in a culturally accepted way. Consequently, being 'creative' in Art means performing a specific set of actions made meaningful when viewed from a curriculum perspective. Furthermore, these actions take place in the art classroom using paint brushes, paint, and canvas, or material otherwise specified by the curriculum[29]. Conversely, using social intelligence to formulate distraction strategies to delay completing a test or spray painting a mural in the toilet without permission are both unlikely to be valued as creative acts by schools. These differences point to the importance of teacher as audience.

Culture can determine whether or not potential is translated into performance, that is, whether or not potential is fulfilled (Runco, 2007). In order to fulfil the 'potential' of a student, the student must first transact and interact within the classroom culture in appropriate ways i.e. they are seen as cognitively and behaviourally engaged. Runco is inadvertently highlighting the link between engagement, the development of creative ability, and culture. Culture is thus central to the development of creative ability. Barab and Plucker (2002) articulate this point succinctly: 'exhibiting talented behaviour involves understanding how to act in a manner that is consistent with those ways that have been socioculturally

[29] Curriculum is an artefact

endorsed—that is, functional for a particular group' (p.174). This positions schools as ecologies that function within a broader cultural context (Immordino-Yang, 2011). More specifically, each classroom operates as a culture that is defined by its goals, values, and accepted ways of achieving (Munro, 2006c). Investigating why students disengage from school thus requires a relational framework that values the impact of culture on individual behaviour.

Important research from VanTassel-Baska, (2018) showed low-income students, regardless of minority status, are likely to display similar learning characteristics. Additionally, these learning characteristics are highly likely to lead to marginalisation because of students' clothing, mannerisms, and peer relations. These students are likely to be independent operators who reject traditional routes to success after missing opportunities to engage in productive social interactions (Albert & Colangelo, 1994; VanTassel-Baska et al., 2009). Instead, they are more likely to interact with supportive and accommodating groups (Ogbu, 1992). Exacerbating these issues, Kolb and Jussim (1994) showed that 'teachers may also respond to gifted children who violate expectations by providing biased evaluations of their classroom performance' (p.29). They go on to say 'when gifted children fail to conform to normative standards in the classroom (e.g., when they appear unmotivated or misbehave), teachers are likely to assign them lower grades' (p.29). This is important to acknowledge when seeking to engage disengaged students, because, as argued in the literature review above, socio-cultural factors are essential considerations in this process. This all points to the possibility that some students may be less likely to internalise the institutional ways of thinking and the values fostered in a regular classroom. In other words, they are less likely to be programmed externally in terms of the cultural patterns of action found in regular classroom; further reinforcing the argument for a model that recognises the different ways students relate, interact, and transact in classrooms.

3.2 A Conceptual Framework for Understanding Engagement of Secondary School Students

This research aims to better understand how perceptions of the audience influences the development of creative ability within a secondary school context. In order to do this, the learning profiles of disengaged students and high ability students are examined. Further to this, consideration is given to the cognitive and non-cognitive factors that are most likely to lead to displays of creative thinking in a regular classroom. It is understood here that a person's actions are a result of their previous interactions, relations, and transactions with the physical and socio-cultural environment, that is, artefacts, audience, and affordances. In the previous section, the reasons for focusing on student's perception of their culture were given.

To research this issue, Glăveanu's (2013) Five A's framework has been operationalised for secondary school settings given its emphasis on actions within a culture. A focus on non-cognitive aspects of the creative process such as the artefacts, affordances, and audiences, provides a language to describe engaged interactions and relations involved in displays of creative thinking in a classroom. Using the Five A's to describe a student's learning profile will enable inferences about how to engage students who are alienated from regular classrooms. This is especially important when considering how to develop classroom cultures that afford students opportunities to participate in school.

There is a clear issue within schools relating to disengagement in Australia. Following Glăveanu's (2015) assertion that understanding creativity involves a holistic approach starting with the careful analysis of conditions and components and 're-centring' the person in a network of relations, the approach taken in this thesis so far attempts to constrain the complex array of constructs involved in creativity. In the next chapter, further work is done to operationalise the Five dimensions to investigate these hypotheses.

Chapter 4
Method and Research Design

This chapter describes the study methods used to investigate the hypotheses outlined in chapter 2. Firstly, the research design is explained and justified. Secondly, an explanation is given concerning how schools were selected and the process of participant recruitment. Thirdly, operational definitions of key categories are unpacked and justified with reference to current literature. Fourthly, the procedure used to investigate the hypotheses is explained. Finally, statistical analysis methods are outlined and justifications for these methods provided.

4.1 Research Design

The aim of the current study is to describe and explain similarities and differences between engaged and disengaged students, and to understand how and why they occur in order to support student develop their creative ability. The study was based on a quasi-experimental design since the data to be collected did not require the manipulation of the situation or the participants (Gray, 2013). This design enables the researchers to use correlational and comparative techniques to identify relationships between variables (Hair et al., 2014). Through statistical analysis, the strength and frequency of these relations are shown. Further, this research design enables comparisons between two or more groups on one or more variables.

To understand the diverse perspectives of the participants, a mixed-method approach based on constructivist assumptions was used. By using a concurrent nested design, the study analysed a large amount of data to confirm, cross-validate, or corroborate findings (Creswell, 2011). This design allows the study to make descriptive and explanatory statements by triangulating the results (Gray, 2013). Using a relational framework based in cultural psychological approach offers a way of understanding the interactions and transactions found

within classroom cultures. In a recent manifesto on advancing creativity theory and research, Glăveanu and colleagues assert 'the field of creativity studies needs both quantitative and qualitative methodologies with strong theoretical grounding' (Glăveanu et al., 2020, p.744). The methods chosen to research the issue, centred on collecting a mix of individualised and standardised data to give an in-depth account of what the participants think and feel but also of what they are capable of.

As discussed above, this study views the issue of disengagement and creative development from the 'We-paradigm'. This approach, which prioritises ecological thinking and is constructivist in nature (Glăveanu, 2010a), has been adopted due to its power to contextualise creative acts but also provide a means for identifying the conditions most likely to lead to students showing their creative ability. This final point is emphasised by Glăveanu because creativity is 'now conceptualized as less dependent on innate abilities and personality traits' (p.84). Creativity is relational and thus requires a methodological framework that captures the relational aspects of creative expression. This study is not attempting to label students as creative or not but to understand the types of interactions and transactions involved in classroom engagement and subsequent development of creative ability.

4.2 Research Sites and Participant Selection

4.2.1 School Selection

The approach to recruiting schools varied. The contact details of these schools were obtained via the DET 'school contact' list. Some schools were emailed directly, while others were contacted via telephone. Schools were provided with a detailed information pack describing the study. The initial selection of potential schools aimed for a mix of Government, Catholic, and Alternative schools. Any school willing to participate was welcomed. 55 schools were contacted; however, only 12 took part in the study. In total, 12 Victorian schools across

15 campuses (3 Catholic, 4 Alternative[30], and 5 Government) took part in the study. The participating schools represented commonly found schools in metropolitan Melbourne.

4.2.2 Participant Selection

Some of the participants were invited due to undertaking their education in alternative settings such as in a community school or re-engagement program embedded within a larger school. The inclusion of students who are disengaged from formal education was essential since these students are often marginalised and excluded from formal education (Smyth & Hattam, 2004). The focus of the study centres around what the student thinks and feels about school as well as capturing what they are able to do in response to classroom-based affordances and artefacts.

Data were collected from 146 participants. The Human Research Ethics Committee at the University of Melbourne, Catholic Education Melbourne, and the Department of Education and Training Victoria (DET) all approved data collection within the schools. Furthermore, informed consent was obtained from the students who participated as well as their parents or guardians prior to data collection. Plain Language Statements and Consent forms can be found in Appendix A. Importantly, the cohort studied in this project is not a proportionally representative cohort for all students across Australia. The participants were in years 8, 9, 10, or 11 during the assessment period. The age range of these students was 14 to 17. Non-probability quota sampling was used identify participants years 8, 9, 10, and 11. This provided the study with in-depth experiential knowledge of formal education across crucial years of schooling. Many disengaged students in the younger years are still in regular classroom programs, yet to experience exclusion from them.

[30] 2 x Community Schools. 2 x Flexible Learning Networks (Government).

Potential participants were invited as a group in most cases. In group settings, potential participants had an opportunity to approach or contact the researchers individually if they had any further questions, and some students did. When individual conversations took place, emphasis was placed on participation in the study being 'voluntary' and their input being seen as high value. Time was taken to discuss the intention of the study i.e. to help future students be more creative at school. This resonated with the participants with most showing a very strong commitment to the study. The recruitment process was as follows:

- Senior staff at selected schools were emailed to organise a suitable time to attend the school to introduce students to the aims of the study.
- Students in years 9, 10, and 11 within each school were invited by the researcher to participate as a group. The size of these groups varied from 5 up to 300 students (Script in Appendix B).
- If a student was interested, the researchers distributed an information pack to the student.
- Potential participants and their parents/guardians then read the plain language statement and completed the consent form at home.
- Interested students who were given parental/guardian permission to take part in the project returned the signed consent form.
- Once the signed consent form was returned to their teacher, the student was able to take part in the project.

4.3 Operational definitions

4.3.1 High Ability

This study used standardised measures of fluid and crystallised ability (these tools will be explained below) to categorise students according to their ability. These groupings

were based on scores on fluid thinking actions measures[31] and crystallised thinking actions measures[32]. Results are shown in Table 6.

Table 2

Likelihood of Gifted Characteristics in General Population

Mildly (or basically) Gifted	115 - 129	1:6 - 1:44
Moderately Gifted	130 - 144	1:44 - 1:1,000
Highly Gifted	145 - 159	1:1,000 - 1:10,000
Exceptionally Gifted	160 - 179	1:10,000 - 1:1 million
Profoundly Gifted	180+	Fewer than 1:1 million

(Gross, 2000)

According to Gagne (2004), about 10 to 15% of people may occupy the full range of 'gifted' abilities (Table 5). Based on this convention, participants with a score in the top 85th percentile on Raven's Standard Progressive Matrices Plus (SPM+) and Millhill Vocabulary Scale (MHV) were identified as 'high ability'. For research purposes, this group of students has been labelled 'high ability' since the conditions of inclusion in the group rest on their score being in the top 15%; students were organised according to four groups according to the following criteria:

- Non-verbal High Ability: A score equal to or above the 85th percentile on the non-verbal intelligence assessment and below the 85th percentile on the MHV.
- Verbal High Ability: A score equal to or above the 85th percentile on the verbal intelligence assessment and below the 85th percentile on the SPM.
- Globally High Ability: A score equal to or above the 85th percentile on both the MHV and SPM.
- Average Ability: A total score below the 85th percentile on both the MHV and SPM.

[31] See 4.5.2
[32] See 4.5.3

Table 3

Ability Group Characteristics

	Overall Sample (*N*= 146)	Global High Ability (*N*= 36)	Verbal High Ability (*N*= 19)	Non-verbal High Ability (*N*= 37)	Average Ability (*N*= 54)
	n (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)
Gender					
Female	67 (45.9)	19 (52.8)	11 (57.9)	18(48.6)	19 (45.9)
Male	79 (54.1)	17 (47.2)	8 (42.1)	19 (51.4)	35 (54.1)
Age					
13 years	5 (3.4)	2 (5.6)	_	3 (8.1)	_
14 years	56 (38.4)	13 (36.1)	10 (52.6)	15 (40.5)	18 (33.3)
15 years	59	17(47.2)	5 (26.3)	11 (29.7)	26 (48.1)
16 years	19 (13)	3 (8.3)	4 (21.1)	5 (13.5)	7 (13)
17 years	7 (4.8)	1 (2.8)	_	3 (8.1)	3 (5.6)
School					
School 1	6 (4.1)	3(8.3)	_	1 (2.7)	2 (3.7)
School 2	15 (10.3)	5 (13.9)	3 (15.8)	4 (10.8)	3 (5.6)
School 3	19 (13)	1 (2.8)	2 (10.5)	7 (18.9)	9 (16.7)
School 4	2 (1.4)	_	_	1 (2.7)	1 (1.9)
School 5	8 (5.5)	2 (5.6)	2 (10.5)	3 (8.1)	1 (1.9)
School 6	1 (0.7)	_	1 (5.3)	_	_
School 7	16 (11)	2 (5.6)	2 (10.5)	4 (10.8)	8 (14.8)
School 8	9 (6.2)	2 (5.6)	1 (5.3)	5 (13.5)	1 (1.9)
School 9	3 (2.1)	1 (2.8)	_	_	2 (3.7)
School 10	3 (2.1)	_	1 (5.3)	1 (2.7)	1(1.9)
School 11	23 (15.8)	14 (38.9)	2 (10.5)	3 (8.1)	4 (7.4)
School 12	9 (6.2)	2 (5.6)	2 (10.5)	_	5 (9.3)
School 13	9 (6.2)	1 (2.8)	_	4 (10.8)	4 (7.4)
School 14	4 (2.7)	_	1 (5.3)	1 (2.7)	2 (3.7)
School 15	19 (13)	3(8.3)	2 (10.5)	3 (8.1)	11 (20.4)

4.3.2 Classroom Engagement

As shown in chapter 3, high ability students differ in how well they relate to school. To investigate hypotheses 1, three categories of engagement were used to represent the current institutional position of the students i.e. Classroom Engaged students (CE), Classroom Disengaged students (CD), and School Disengaged students (SD). Students who fall into Classroom Engaged (CE) group participate in regular school programs and are most often liked by teachers for being responsible, reliable, dependable, tolerant, logical, moderate, good-natured, steady, and practical (MacKinnon, 1963). These students are seen as behaviourally engaged, that is, acting as expected and allowed to remain in regular classes. Classroom Disengaged (CD) students may be seen as a hindrance in regular classroom cultures for not completing work or following rules and may have been separated from the CE students for specialised intervention. Classroom Disengaged (CD) refuse, are reluctant to engage, or are unable to engage with the learning in a regular classroom; they may have to complete some type of 're-engagement' program within their school. Finally, School Disengaged (SD) are disengaged from a regular school and are currently undertaking educational programs in an irregular setting such as a full-time reengagement programs, community school or flexible learning network. These alternative settings may be linked to regular schools. Table 8 provides further information.

4.3.3 Ability and Engagement

Many high ability students disengage from formal education (Munro, 2006a; Betts & Neihart, 1988). To investigate the second hypothesis, the learning characteristics of engaged and disengaged high ability students will be analysed for similarities and differences. This combination leads to four categories for comparative analysis: High Ability Classroom Engaged (HA CE), High Ability Classroom Disengaged (HA CD), Average Ability Classroom Engaged (AA

CE), Average Ability Classroom Disengaged (AA CD). This merging of ability and engagement categories allows for the second hypothesis to be investigated to elucidate the conditions most likely to engage high ability student and support the development of creative ability.

Table 4

Engagement Group Characteristics

	Overall Sample (*N*= 146)	*Classroom Engaged* (*N*= 67)	*Classroom Disengaged* (*N*=39)	*School Disengaged* (*N*=40)
	n (%)	*n* (%)	*n* (%)	*n* (%)
Gender				
Female	67 (45.9)	37 (55.2)	21(53.8)	9(22.5)
Male	79 (54.1)	30(44.2)	18 (46.2)	31(77.5)
Age				
13 years	5 (3.4)	4 (6)	0	1 (2.5)
14 years	56 (38.4)	29 (43.3)	19 (48.7)	8 (20)
15 years	59 (40.4)	29 (43.3)	18 (46.2)	12 (30)
16 years	19 (13)	5 (7.5)	2 (5.1)	12 (30)
17 years	7 (4.8)	_	_	7 (17.5)
School				
School 1	6 (4.1)	2 (1.4)	4 (2.7)	_
School 2	15 (10.3)	10 (6.8)	5 (3.4)	_
School 3	19 (13)	6 (4.1)	10 (6.8)	3# (2.1)
School 4	2 (1.4)	_	_	2 (1.4)
School 5	8 (5.5)	5 (3.4)	3 (2.1)	_
School 6	1 (0.7)	_	_	1 (0.7)
School 7	16 (11)	7 (4.8)	3 (2.1)	6# (4.1)
School 8	9 (6.2)	8 (5.5)	1 (0.7)	_
School 9	3 (2.1)	-	-	3 (7.5)
School 10	3 (2.1)	-	-	3 (7.5)
School 11	23 (15.8)	18 (12.3)	5 (3.4)	_
School 12	9 (6.2)	-	-	9 (6.2)
School 13	9 (6.2)	-	-	9 (6.2)
School 14	4 (2.7)	-	-	4 (2.7)
School 15	19 (13)	11 (7.5)	8 (5.5)	

Table 5

Ability and Engagement Group Characteristics

	Overall Sample (*N*= 146)	HAE (*N*= 51)	HAD (*N*=41)	AAE (*N*= 16)	AAD (*N*= 38)
	n (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)
Gender					
Female	67 (45.9)	28 (54.9)	19 (46.3)	9 (56.3)	11 (28.9)
Male	79 (54.1)	23 (45.1)	22 (53.7)	7 (43.8)	27 (71.1)
Age					
13 years	5 (3.4)	4 (2.7)	1 (0.7)	_	_
14 years	56 (38.4)	23 (15.8)	15 (10.3)	6 (4.1)	12 (8.32)
15 years	59 (40.4)	20 (13.7)	14 (9.6)	9 (6.2)	16 (11)
16 years	19 (13)	4 (2.7)	8 (5.5)	_	7 (4.8)
17 years	7 (4.8)	_	3 (2.1)	1 (0.7)	3 (2.1)
School					
School 1	6 (4.1)	1 (0.7)	3 (2.1)	1 (0.7)	1 (0.7)
School 2	15 (10.3)	7 (4.8)	5 (3.4)	2 (1.4)	1 (0.7)
School 3	19 (13)	3 (2.1)	7 (4.8)	3 (2.1)	6 (4.1)
School 4	2 (1.4)	_	1 (0.7)	_	1 (0.7)
School 5	8 (5.5)	4 (2.7)	3 (2.1)	1 (0.7)	0
School 6	1 (0.7)	_	1 (0.7)	_	_
School 7	16 (11)	7 (4.8)	1 (0.7)	_	8 (5.5)
School 8	9 (6.2)	7 (4.8)	1 (0.7)	1 (0.7)	_
School 9	3 (2.1)	_	1 (0.7)	_	2 (1.4)
School 10	3 (2.1)	_	2 (1.4)	_	1 (0.7)
School 11	23 (15.8)	15 (10.3)	4 (2.7)	3 (2.1)	1 (0.7)
School 12	9 (6.2)	_	4 (2.7)	_	5
School 13	9 (6.2)	_	5	_	4 (2.7)
School 14	4 (2.7)	_	1	_	3 (2.1)
School 15	19 (13)	7 (4.8)	2 (1.4)	4 (2.7)	6 (4.1)

***** *Alternative setting. Specific detail has been withheld to hide the identity of schools and participants.*

 # These students were in the process of leaving school early or changing schools

4.4 Data Collection

To investigate the hypotheses, data were collected using a varied set of instruments. Table 6 provides a map of the factors discussed in chapter 2 as well as the constructs measured in this project. This elaborated version of the Five A's framework summarises the factors discussed in chapter 2 for the purpose of researching engagement in formal educational contexts. These tasks were chosen to offer participants multiple ways to show their capacity to respond to affordances found in classroom tasks. Justification for each tool is given below.

4.5 Measuring Academic Thinking Actions

According to Munro (2006), classroom learning requires sequential processing of both verbal and non-verbal teaching or instructional information. As discussed in chapter 2, working memory capacity influences how much of these cultural patterns of action are internalised. Academic Thinking Actions refer to cognitive processes which are central to participating in regular classrooms i.e. verbal and non-verbal sequential processes, basic verbal recollection, verbal memory, visual memory, fine motor skills, and attention (Hammill, 1998). Accordingly, these specific processes differ from general cognitive functions in that they represent processes required for success in a regular classroom culture, though these processes are not only evoked in a formal classroom. Mastery of these components is essential to success in a regular classroom.

Table 6

Extended Five A's

Adapted from Glăveanu (2013)

Components	Focus	Brief Description	Adapted/extended aspects from review
Actor	Personal attributes in relation to a societal context	The actor is a person embedded in the field of social relations specific to any human community and society.	• Motivation • Identity • Self-efficacy • Attention • Schizotypy
Actions	Coordinated psychological and behavioural manifestation	Action is both psychological and material, internal and external, goal directed, structured, and symbolic or meaningful. Creativity is not a 'thing' but an action in and on the world	• Sequential Thinking • Crystallised Thinking • Fluid Thinking • Divergent Thinking • Convergent Thinking • Critical Thinking • Inferential Thinking
Artefact	Cultural context of artefact production and evaluation	Referring to products as artefacts draws attention to their 'cultured' nature and the cumulative character of creation in human groups and societies. Indeed, unlike products, artefacts can never standalone but are cultural.	• Natural sciences • Mathematics • Technology and Computer Science • Humanities • Arts (music, painting, Fashion) • Languages • Athletics and sports • Social relationships
Audience	The interdependence of creators and a social world	Represents multiple others assisting, contributing, judging, criticising, or using the creative act and/or resulting artefact(s).	• Teachers • Students
Affordances	The interdependence of creators and a material world	The affordances of the environment are what it offers to the individual, what it provides or furnishes, either for good or ill	• Symbolic • Material

4.5.1 Academic Thinking Actions Assessment 1: Detroit Test of Learning Aptitude

The Detroit Test of Learning Aptitude Version 4 (DTLA) tests specific cognitive abilities involved in both general intelligence and distinct ability areas (Hammill, 1998). These tests provide a snapshot of the intellectual and behavioural processes related to the thinking actions required for success in a regular classroom i.e. language processing and attentional capacity. Sub-tests used:

Non-verbal Sequencing:

Design Sequences – The examiner shows a stimulus card with a sequence of designs for 5 seconds to the student. Remove the card and instruct the student to reproduce the designs from memory using the supplied cubes. This sub-test measures visual sequential memory, visual-motor integration, visual discrimination, and working memory for non-meaningful figural material (Hammill, 1998).

Reversed Letters - The examiner says a sequence of random letters, one letter per second, when finished the sequence, the student writes each letter in reverse order. This sub-test measures executive function, visual sequencing, non-verbal working memory, and fine motor ability (Hammill, 1998).

Verbal Sequencing:

Sentence Imitation - The examiner reads a meaningful sentence without modulation. Once finished, the student attempts to say the sentence back to the examiner verbatim. This sub-test measures verbal sequential memory, syntax, and semantic knowledge. When the sentences are longer the student relies on their syntactic knowledge to recall the sentence. Success in this sub-test requires utilising sequential memory for spoken sentences, a skill that is highly influenced by competence in using Standard English (Hammill, 1998).

Word Sequences - The examiner reads a series of unrelated and isolated words to the student who then repeats these words verbatim. This sub-test measures verbal short-term memory, semantic ability, and executive function (Hammill, 1998).

Semantic Knowledge:

Word Opposites - students are required to comprehend the meaning of the stimulus word that is said to them (noisy, for example), but must respond by saying a word that means the opposite (such as quiet). This sub-test measures verbal short-term memory, executive function, and simple and highly complex vocabulary, that is, semantic knowledge. This sub-test differs from the other DTLA sub-tests used because it does not measure sequential process. It does complement the MHV due to its measuring vocabulary/simultaneous processing (Hammill, 1998).

4.5.2 Academic Thinking Actions Assessment 2: Raven's Progressive Matrices

Fluid thinking actions involve relational reasoning: the ability to find associations amongst representations of objects and ideas (Crone et al., 2009). The SPM+ 'requires participants to identify relevant stimulus features based on the spatial organisation of an array of stimuli and then to select the choice stimulus that matches one or more of these identified features' (Crone et al., 2009, p.2). This assessment has been used for cross-cultural testing and to measure the non-verbal ability of people from highly dissimilar backgrounds and academic abilities (Anastasi, 1982). Through longitudinal research, it has been established that fluid thinking ability is a leading indicator of changes in crystallised thinking actions and academic achievement (Ferrer & McArdle, 2004; McArdle et al., 2000). This is important to keep in mind when working with students who may not be programmed easily by the academic culture, since an indicator of academic enculturation is vocabulary.

For this study, non-verbal intelligence is defined in terms of *fluid thinking actions*. Participants' fluid thinking actions were assessed using Raven's Standard Progressive Matrices - Plus (SPM+) (Raven, 1998). SPM+ is a validated measure of general cognitive functioning in which students select the part that is needed to complete a pattern. The SPM is divided into five sections with each section becoming progressively harder. Sections A and B each contain 12 2x2 matrices, whereas sections C, D, and E each contain 12 3x3 matrices. The latter sections necessitate highly complex abstract reasoning to find the solution. The type of reasoning involved resembles mathematical reasoning more than verbal reasoning and can identify a wide range of fluid thinking ability. Students were administered the SPM+ in an untimed group setting in spaces familiar to them.

4.5.3 Academic Thinking Actions Assessment 3: Mill Hill Vocabulary Scale

Verbal ability is a strong indicator of formal cultural knowledge since an important feature of regular classroom cultures is the use of verbal language. Munro (2005) found verbal high ability students to have more elaborated and differentiated knowledge structures when compared to non-high ability students. This manifests in extensive vocabularies, complex semantic networks rich in general knowledge, an increased ability to access semantic networks, and increased verbal reasoning capacity. The Mill Hill Vocabulary (MHV) (Raven, 2000) measures crystallised thinking in school-age children from six to eighteen. The MHV complements the SPM+ to provide a robust assessment of fluid thinking actions. As stated previously, verbal thinking ability is a strong indicator of previous formal academic learning since an important feature of regular classroom cultures is the use of verbal language.

The MHV has 88 questions making up two types of tasks. In set A, the students were required to provide definitions for the 44 presented words in written form. In Set B, students

complete multiple-choice questions asking for the correct definition of 44 words. The raw scores were used to compute Standard scores and percentile ranks in accordance with the SPM+ Manual (Raven, 1998). Finally, the MHV was untimed. Vocabulary scales are used to measure ability levels in all students; in conjunction with the SPM+, the MHV is especially suitable to assess thinking actions of highly able children.

Table 7
Breakdown of assessments

Academic Action Assessments	Academic Actions
DTLA Word Sequences (V) • short-term memory for spoken words • semantic ability • executive function	**Sequential Thinking**
DTLA Sentence Imitation (V) • verbal sequential memory, • syntax and semantic knowledge	
DTLA Design Sequences (NV) • visual sequential memory • visual-motor integration • visual discrimination • visual working memory	
DTLA Reversed Letters (NV) • Executive function • visual sequencing • non-verbal working memory • fine motor ability	
DTLA Word Opposites • short-term verbal memory • executive function • highly complex vocabulary (semantic knowledge)	**Crystallised Thinking Actions**
MH Vocabulary Scale • semantic knowledge	
SPM+ • Mathematical/symbolic Reasoning • Working memory • Pattern recognition • Clear thinking	**Fluid Thinking Actions**

4.6 Measuring Creative Thinking Actions

Current definitions of 'creativity' contain two components and refer to artefacts; that is, creativity involves the production of something different, new, or innovative, but appropriate to task demands (Kaufman & Sternberg, 2007; Sternberg et al., 2002; Sligh et al., 2005). From this perspective, novelty[33] is mostly related to divergent thinking actions, whereas utility and relevance is related to convergent thinking actions.

Divergent thinking tests may allow useful estimates of what students can do (Runco, 2012; Yoruk & Runco, 2014); however, the approach[34] taken in this project goes beyond traditional dichotomies and measures two additional thinking actions involved in creative performance, critical thinking (Urban, 2002, 2003), and inferential thinking (Munro, 2003, 2005b). Critical thinking actions involve purposeful and reflective judgement when considering personal beliefs or actions (Galatis, 2013). According to Urban's componential theory of creativity (2005), the final stage of creative production requires the actor to think critically and to evaluate the creative outcome in order to achieve a balance between convergent and divergent thinking. Creativity thus involves a combination of divergent and convergent thinking while also involving 'critical processes' that evaluate the results of divergent thinking for workability, acceptability, or effectiveness according to the material and symbolic affordances of the artefact (Lonergan et al., 2003).

[33] This project assesses *Little C* creativity in a classroom context. This means that the originality of their responses is less relevant. The reason for this is that *Little C* creativity refers to personal creativity, that is, not socially or historically significant.

[34] See section 2.5 for elaborated discussion on the for Creative Thinking actions.

Table 8

Overview of Creative Action Assessment

Creative Action Assessment	Dimension	Characteristics of Task Structure	Domain
Social Problem-solving Task	Q1 - What would be the best way to get students buying more nutritious foods from the canteen?	• High Imposition • Integrative • Sequential	Verbal
	Q2 - What difficulties do you think you would face?	• Low imposition • Generative • Sequential	Verbal
	Q3 - How could you overcome these difficulties?	• High Imposition • Integrative • Sequential	Verbal
	Q4- How do you know your suggestion would work?	• High Imposition • Generative • Sequential	Verbal
	Q5 - Other than your school, who might be affected by your solution?	• Low imposition • Generative • Sequential	Verbal
Broken Cup	Give as many ways as you can to explain how the cup broke	• Medial Imposition • Generative	Verbal & Visual[35]
Alternative Uses	Paper Clip	• Low imposition • Generative	Verbal & Visual
	Brick	• Low imposition • Generative	Verbal & Visual
	Peg	• Low imposition • Generative	Verbal & Visual
The Shape Game	S1 Use the Circle	• Low imposition • Generative	Visual - Figural
	S2 Combine the shapes	• Medial Imposition • Generative • Integrative	Visual - Figural
	S3 Complete the picture	• High imposition • Integrative	Visual - Figural

[35] Visual thinking is an important construct (Heller, 1991; Kim, 2006; Torrance, 1968, 1972)

Complementary to the other three thinking actions is inferential thinking. Inferential thinking involves drawing together multiple pieces of information and generating ideas and conceptions not specified in the original stimulus information (Barrett, 1968; Blank et al., 1978). High Ability students have been shown to include concepts in their solutions that were not mentioned in the scenario problem-solving tasks (Munro, 2015). They also inferred new concepts from teaching situations, expressing these inferences in concept maps (Santoro, 2016). Further, Geake (2008) proposed that high ability students are more likely to use both divergent and convergent thinking strategies spontaneously and selectively in a balanced way while also thinking inferentially and evaluatively. Furthermore, they are more likely to synthesise their inferences into an intuitive model of the world (Munro, 2015).

Initially, divergent thinking tasks involved unconstrained verbal and figural ideation howerver, researchers have now developed domain-specific tests centred on real-world issues to measure complex reasoning through and problem-solving skills in students (Munro, 2012; Scott et al., 2004; Treffinger & Isaksen, 2005). Domain-specific tasks demand more alignment with task structure. In the current study, students completed a mix of open tasks and more imposed tasks. Verbal and figural assessments were utilised to investigate these thinking actions. An overview of the assessments measuring divergent thinking, convergent thinking, critical thinking, and inferential thinking can be found above in Table 8. In the current study, creative thinking actions are measured using four assessments:

1. Social Problem-Solving Task
2. Broken Cup Task
3. The Shape Game
4. Alternative Uses.

4.6.1 Creative Thinking Actions Assessment 1: Social Problem-Solving Task

Social problem-solving tasks (SPST) require open-ended and real-world thinking to find plausible solutions. These tasks suit all students, engaged and disengaged, as well as high ability students (VanTassel-Baska, 2018). By presenting challenging problems to students, they have opportunity to demonstrate advanced understanding and thinking on topics not covered by the teaching (VanTassel-Baska et al., 2007). They also provide an opportunity for students to show 'all they know/can do' in relation to a topic or issue, to demonstrate the depth of their thinking, and provides an opportunity for students to achieve diverse outcomes by describing responses in terms of the quality of knowledge and thinking that underpins those responses (Munro, 2011).

These tasks lack a single solution path thereby forcing respondents to draw on their prior knowledge to infer a solution to the affordances offered in the scenario. Furthermore, within the problem scenario, several issues that may be interacting with each other will require adaptive and complex responses. Munro (2015) showed that high ability students were significantly more able to infer solution pathways that draw together multiple pieces of information not specified in the prompt; students with the highest SPST scores showed a higher level of inferential and divergent thinking. The high ability students also articulated intuitive theories relevant to the problem-solving context, as suggested in findings from Geake (2008). In summary, these tasks require use of divergent thinking, convergent thinking, critical thinking, and inferential thinking actions.

4.6.2 Creative Thinking Actions Assessment 2: The Broken Cup

The Broken Cup affords the students to generate as many responses as they can to an image of a broken cup. This task asks the student to respond to the picture with an explanation about what happened to the cup. These responses may be brief dot points, or more

elaborated stories. This task gives students an opportunity to create possible worlds in which transformative actions act upon the cup, and to communicate what is 'going on' in the imagined scenario. These actions may be simple literal actions, such as *dropping* or *throwing,* but more complex actions within contexts may be inferred; for example, the 'two parts *grew* to be like this' or 'the cup *split* by a chemical reaction'. The context may be literal insofar as it mimics the context of the picture, or it may be an inferential context where the student hasn't accepted what they literally see. They may suggest, for instance, that the cup 'is buried with a person', or that 'a person stared at it', or 'it's not a cup made of ceramic material', or give it animate qualities, or say that cup is an optical illusion. It is assumed that the student uses their knowledge to generate responses to the image. The assessor identifies patterns of thinking actions that represent literal and inferential thinking within responses. Scoring the inferential dimension involves analysing the response for the quality of information given.

4.6.3 Creative Thinking Actions Assessment 3: Picture Shape Game

The Figural tasks require the student to modify, elaborate, extend, connect, visualise, and imagine possibilities using figural modality. While verbal measures of creative thinking have been shown as more strongly related to intelligence, figural drawing tasks may indicate a potential measure of creative thinking in a non-academic domain (Eyal & Lindgren, 1977). These tasks allow for students who do not have a rich vocabulary to communicate the richness of their thinking, humour, affectivity, movement or action, and their divergence from usual perspectives. The three tasks are as follows:

PS 1: Use this circle in a drawing:

Participants are asked to use the circle drawn on a piece of paper as a picture. They can draw whatever they want to make any novel picture. This activity has a loosely imposed structure and is similar to other divergent figural tasks (Torrance, 1962).

PS 2: Combine all the shapes into one drawing:

Participants are instructed to construct a picture by making use of four shapes provided. They may alter the shapes or use them as they are as well as add any other shapes and details. This activity represents a medial imposition in terms of students being asked to use all the shapes in one drawing.

PS 3: Complete a picture using these shapes:

This test is similar to the drawing completion test developed by Kate Franck (Franck & Rosen, 1949). Participants are given a piece of paper with two shapes on it. They are asked to complete the picture without moving the shapes. This final activity imposes the highest amount of structure in that it asks the students to replicate and add elements without modifying the initial drawing. The student must integrate their ideas into the existing structure.

4.6.4 Creative Thinking Actions Task 4: Alternative Uses Task

Alternative use style tasks are classic divergent thinking tasks. These tasks ask participants to generate as many possible uses as possible for familiar objects. In this study, quantity and time constraints were removed, and participants were asked to list as many alternative uses for a paperclip, peg, and a brick as they could. Removing quantity constraints means the test can be used to 'understand the relationship between quantity of ideas and novelty of ideas' (Dippo & Kudrowitz, 2013). For this reason, fluency was the primary focus of this task. The tasks targeted open verbal thinking, with fluency the least constraining construct within the scoring criteria.

4.7 Measuring Non-Cognitive Factors of the Student as Actor

The final focus of the current study is the student/actor's knowledge of themselves, their culture, and their perceived affordances within their formal educational setting. The

questionnaire[36] is a self-report survey that reflects an approach used on several occasions (Furnham, 1997; Gray, 1972). In a previous study, Furnham (1997) found that 'people consistently predicted their own personality test scores with correlations in the order of 0.30 to 0.50 for different personality factors' (Karwowski, 2011, p.156). Ochse (1990) suggested that 'contemporary creators... have good insight into their own capabilities. They typically describe themselves explicitly as creative' (p.127). Further, Barron and Harrington (1981) argued a self-rating of creativity is a valid measure given creative people are insightful and highly aware of their own creativity.

Participants completed the questionnaire using a 5-point Likert scale from 1 (strongly agree) to 5 (strongly disagree). The 5-point scale was selected since 5-point and 7-point Likert scales are comparable, having been shown to produce the same mean score (Dawes, 2012). Scores of 1 (strongly agree) and 2 (agree) indicated that the participant agreed with the statement; a score of 3 indicated they were neutral; while scores 4 (disagree) to 5 (strongly disagree) indicated levels of disagreement.

The questionnaire targets three domains of knowledge:

- Knowledge of the Actor
- Knowledge of the Audience
- Knowledge of the Affordances.

Each of these domains contains multiple dimensions. These dimensions are constructs that enable researchers to understand the larger components involved in creativity. These dimensions are as follows:

Knowledge of the Actor:

[36] (Batey & Furnham, 2006, 2008; Burch et al., 2006; DiLiello & Houghton, 2008; M. J. C. Forgeard & Elstein, 2014; Fredricks et al., 2011; Furnham & Bachtiar, 2008; Tierney & Farmer, 2002; Vladut, Liu, Leana-Tascila, Vialle, & Ziegler, 2013).

- Organismic learning capital (Vladut et al., 2013)
- Actional learning capital (Vladut et al., 2013)
- Episodic learning capital (Vladut et al., 2013)
- Attentive learning capital (Vladut et al., 2013)
- Telic learning capital (Vladut et al., 2013)
- Self-efficacy (Tierney & Farmer, 2002)
- Schizotypy (Batey & Furnham, 2006, 2008; Burch et al., 2006)
- Engagement with formal learning (Fredricks et al., 2011)
- Motivation for being creative (Forgeard & Elstein, 2014)
- Implicit Theory of Creativity.

Knowledge of the Audience:

- Perceived Creative Support (DiLiello & Houghton, 2008)
- Cultural capital (Vladut et al., 2013)
- Social capital (Vladut et al., 2013)
- Didactic capital (Vladut et al., 2013)

Knowledge of the Affordances:

- Economic capital (Vladut et al., 2013)
- Infrastructural capital (Vladut et al., 2013)
- Opportunities to Practice (DiLiello & Houghton, 2008).

Knowledge of Artefacts:

- Domains of expression (Heller, 2008).

Knowledge of School Improvement:

- 'How can school become a place for you to be more creative?'

- ‘How would you like school to be different?’

4.7.1 Knowledge of the Actor as a Student

4.7.1.1 Organismic learning capital

Ziegler and Baker (2013) define organismic learning capital as ‘the physiological and constitutional resources of a person’ (p.29). The healthy mental and physical state of students is critical to productive learning in school given good health mediates the execution of action. Dilley (2009) showed the connection between health and academic success. Additionally, Maslow argued that our cognition centres on satisfying our basic needs before it can turn to higher needs (Maslow & Lewis, 1987). Children with poor health perform worse than their healthy peers (Nagane, 2004); therefore the good health of children promotes learning. Student responses to the following statements measure their perception of their quality of health and its connection to their being creative for long periods of time:

1. My good health helps me to be creative.
2. My physical health is so good that I can be creative nonstop without getting tired.
3. When I want to improve my creativity, I can practise for a long time without getting tired.
4. My physical health is so good that I can even concentrate on difficult subject matter for a long time.
5. My creative thinking makes me feel physically healthy.

4.7.1.2 Actional learning capital

‘Actional learning capital refers to the action repertoire of a person – the totality of actions they are capable of performing’ (Ziegler & Baker, 2013, p.30). In addition to measuring the learning and creative actions of which students are capable, this measure aims to bring out students’ knowledge of their own creative ability. Student responses to the following

statements aim to measure their metacognitive and self-regulatory knowledge, and their ability to use creativity at school:

1. What I know already helps me be creative at school.
2. I know how to think creatively in lots of ways.
3. I know how to get ready to be creative in class.
4. If I use all of my creative ability, I can be among the best in school.
5. I can tell when and how it is best to be creative in class.

4.7.1.3 Telic learning capital

Telic Learning capital is 'the totality of a person's anticipated goal states that offer possibilities for satisfying their needs' (Ziegler & Baker, 2013, p.30). Planning for future learning is essential for success and the execution of action sequences. Having plans and goals for future activities and events stimulates and directs behaviour, while such visions of the future encourage present behaviour (Renzulli, 2002). Accordingly, having effective goals helps students extend their work (Renzulli & De Wet, 2010). Further to this, Greene and Miller (1996) showed meaningful cognitive engagement is influenced by a student's perceived ability and learning goals. Responses to the following prompts aim to measure the students' knowledge of their own goal-setting in relation to creative outcomes, goal-setting in relation to school/creative capacity, norm referencing/ social comparison of creative outcomes, and metacognition/reflection about creativity:

1. I know what I need to learn to be more creative.
2. I have an idea about what my next creative project will be (doesn't have to be at school).
3. I aim to improve my creative ability at school.
4. I want to be one of the most creative at school.

5. I plan when, how, and where I will be creative.

4.7.1.4 Episodic learning capital

Episodic learning capital involves making effective use of one's own thinking actions by utilising prior experience. According to Vladut et al. (2013), episodic learning capital differs from actional capital since the latter is only concerned with executable actions. 'Episodic learning capital concerns the simultaneous goal- and situation-relevant action patterns that are accessible to a person' (Ziegler & Baker, 2013, p.31). This aligns with the Benedek et al. (2014) study that showed episodic memory is highly implicated in new and old idea generation. Being able to use experience is vital for adapting to novel situations. Responses to the following prompts aim to measure the student's awareness of their own experience being creative, how this experience serves them to improve and achieve goals, and if school experiences assist them to be creative:

1. I already have a lot of experience on how to be creative.
2. I know from experience how I can use my creative thinking to achieve my goals.
3. I know from experience how I can improve my creativity.
4. My school experiences have taught me how I can be highly creative at school.
5. I already have a lot of experience about when, how, and where I can be creative most effectively.

4.7.1.5 Attentional learning capital

'Attentional learning capital denotes the quantitative and qualitative attentional resources that a person can apply to learning' (Ziegler & Baker, 2013, p.31). A student's capacity to focus and commit to goals is essential for success in school and life (Renzulli & De Wet, 2010). Many high ability students have difficulty focusing their attention in class, resulting in disengagement (Munro, 2002). More specifically, the quality of concentration and

attention predicts later achievement at school (Vladut et al., 2013). Responses to the following prompts aim to measure the student's commitment to being creative at school, their persistence, commitment to giving attention to improving creative thinking, quality of creative task attention, and the quantity of attention given to creative thinking:

1. An important goal for me is being creative at school (how much they want to be focus on being creative).
2. I can focus completely on being creative in class.
3. I like to be creative in class for long periods of time (desire to be creative for a long time).
4. I can be creative in class without getting distracted.
5. My thoughts are often highly creative.

4.7.1.6 Creative Self-Efficacy

Many studies have shown creative self-efficacy to be predictive of creative performance (Hammond, 2011; Tierney, 2002). Tierney and Farmer (2002) define creative self-efficacy as 'the belief that one has the ability to produce creative outcomes'(p.1138). This study seeks to understand students' views relating to their own creative ability and if these beliefs affect their performance on creativity tasks. In order to measure participants' creative self-efficacy, a 7-point scale was adapted from DiLiello (2008) Tierney and Farmer (2002). The scale comprised the following items:

1. I feel that I am good at generating new ideas.
2. I have confidence in my ability to solve problems creatively.
3. I am good at expanding other people's ideas.
4. I am good at finding creative ways to solve problems.
5. I have the talent and skills to be creative.

6. I feel comfortable trying out new ideas in class.
7. I am scared to fail in front of others.

Items 1 to 4 were taken from Tierney and Farmer's (2002) research, whereas statements 5 to 6 were taken from DiLiello & Houghton's (2008) study of workplace creative potential. The latter study investigated employees' creative potential and practice. Several studies have developed the accuracy of the scale (Jaussi et al., 2007; Tierney & Farmer, 2004; Yang & Cheng, 2009).

4.7.1.7 Schizotypal Personality Measures

As indicated in chapter two, recent research has shown overlap between creative, schizotypal personality traits[37] and socialisation (Fink et al., 2014; Galang, 2010). These findings suggest that overlapping mental processes are implicated in both creative thinking and schizotypy. More specifically, scoring high in schizotypy has been correlated with patterns of brain activation involved in thinking. The significance of this research lies in the conclusion that many highly creative individuals may not be easily socialised. This has important implications for the development of creative ability.

The *Unusual perceptual experiences/magical thinking* prompts below describe unusual perceptions, magical thinking, and illusions. This measure is closely correlated to openness to experience (Furnham et al., 2009):

1. When it is dark, I see shapes and forms even though there's nothing there.
2. People in my daydreams seem so true to life that I sometimes think they are real.
3. I feel that I have special or magical powers.

[37] Schizotypal personality traits: Cognitive Disorganization, Impulsive Nonconformity, Unusual Perceptual Experiences/Magical Thinking (Burch et al., 2006; Gray et al., 2002; McMillan et al., 2013) as well as over-inclusive thinking and broad associative horizons (Eysenck, 1997; Galang, 2010)

4. I suddenly feel distracted by distant sounds that I am not normally aware of.
5. Accidents can be caused by forces greater than me.
6. My fantasies can seem as real as actual events in my life.
7. My thoughts automatically cause an enormous number of ideas and other thoughts.

The *impulsive nonconformity* prompts below describe impulsivity and the forms of anti-social and eccentric behaviour in Schizotypy (Mason & Claridge, 2006, p.204):

1. I often feel like doing something shocking or controversial.
2. I like other people to be afraid of me.
3. I often have the urge to break or smash things.
4. I often have an urge to hit someone.
5. I often feel like doing the opposite of what people suggest, even though you know they are right.
6. I have cheated at games or tests.

The *cognitive disorganisation* items that follow measure elements of attention and concentration deficit, lack of decision-making power, and social anxiety (Mason & Claridge, 2006, p.204). This factor reflects thought disorder and other disturbances in psychosis.

1. I am easily confused if too much happens at once.
2. I am easily distracted from work by daydreams.
3. I am easily distracted when I read or talk to someone.
4. I frequently have difficulties starting to do things.
5. My mood goes up and down easily.

4.7.1.8 School Engagement

Student engagement with classroom teaching is an important component of classroom learning that is related to academic achievement at school (Archambault et al., 2009; Fredricks

et al., 2004; Reschly & Christenson, 2006). Further to this, disengagement is included in the predicted trajectory of early school leavers (Bradshaw et al., 2008; Dunn et al., 2004; Finn, 1993). The process of disengagement starts early in schooling culminating in dropping out of formal education before graduation (Lovelace et al., 2017; Renzulli & Park, 2000; Robertson, 1991; Smyth & Hattam, 2004).

Connell and Wellborn (1991) differentiate two ends of an engagement continuum: engagement and disaffection. Engaged students are behaviourally active, are involved in learning, and have a positive emotional tone. These students tend to continue when faced with a challenge (Connell & Wellborn 1991). On the other hand, disengaged students may be passive, give up easily, and display negative emotions (Fredricks et al., 2004; Skinner & Belmont 1993). 3 dimensions of student engagement are explored in the current study: behavioural, emotional, and cognitive.

Behavioural engagement is characterised by involvement in academic, social, or extracurricular activities vital for achieving positive academic outcomes v(Connell & Wellborn 1990; Fredricks et al., 2011).

1. When I'm in class, I listen very carefully.
2. When I'm in class, I just act like I'm working.

Emotional engagement describes the extent of positive (and negative) reactions to teachers, peers, and school. Connectedness has been strongly associated with students' willingness to work (Connell & Wellborn 1990; Finn 1989; Fredricks et al., 2011).

1. I feel happy to be part of school.
2. When we work on something in class, I feel discouraged.
3. Overall, I feel good about being in this school.
4. School is one of my favourite places to be.

5. I find school fun and exciting.
6. I don't care if I get into trouble for not doing schoolwork.

Cognitive engagement refers to the level of mental energy and focus in learning. This involves being making an effort on school tasks to comprehend complex ideas or master difficult skills (Fredricks et al. 2004; Fredricks et al., 2011).

1. I want to learn as much as I can in school.
2. I work hard to do my best in class.
3. The tests in my classes do a good job of measuring what I'm able to do.
4. Getting an education is really important.

4.7.1.9 Motivation

Currently, researchers conceptualise engagement as different from motivation (Liem & Chong, 2017; Wang & Degol, 2014). Liem & Martin (2012) argue that motivation is 'individuals energy and drive to learn' and desire to 'achieve their potential' (p.3). Forgeard and Mecklenburg (2013) investigate the bi-directional nature of the interactions between creators and others. In this study, the authors adopted a two-dimensional framework that differentiates the locus of motivation from the intended beneficiaries of the creative work. They argued that each of the dimensions, intrinsic and extrinsic, contains four motivational orientations: Growth, Gain, Guidance, and Giving (Forgeard & Mecklenburg, 2013, p.258). This framework allows for a more detailed understanding of motivation by acknowledging students are intrinsically and extrinsically driven by simultaneous motivational orientations. These orientations consist of *Growth* (personal benefits afforded by the creative process), *Gain* (extrinsic and self-oriented focus on the external rewards constituting outcomes of the creative work), Guidance (intrinsic and other-oriented focus on benefits for others afforded

by the creative process itself), and Giving (extrinsic and other-oriented focus on benefits for other people constituting external outcomes of the process) (Forgeard & Mecklenburg, 2013). To measure these orientations, the following prompts were used:

Growth:

1. I feel that being creative will help me grow as a person: Intrinsic-Self (Growth)
2. I practise being creative so I become really good at it: Intrinsic-Self (Growth).

Gain:

1. I am creative because other people think it is something worth doing - Extrinsic-Self (Gain).
2. I am creative so others will like me more – Extrinsic - Self (Gain).

Guidance:

1. I am creative to help other people - Intrinsic-Others (Guidance).
2. I am creative so that other people can be creative too - Intrinsic-Others (Guidance).

Giving:

1. My creativity makes my friends and classmates happier - Extrinsic-Others (Giving).
2. People expect me to be creative, so I am - Extrinsic-Others (Giving).

(Forgeard & Mecklenburg, 2013)

4.7.2 Knowledge of the Audience

The acquisition of sociocultural knowledge differs for all, yet there is overlap. Cognitive development means converting social relations, which are heavily embedded in cultural practices, into mental functions (Glăveanu, 2014; Rogoff, 2003; Vygotsky, 1980). These social interactions determine how students use the tools of the culture. The better a person is able to use the tools, the better they are at completing the tasks the tools were meant for. It has

been argued that how one uses tools is the basis of intelligence (Bruner, 1975). Knowledge of the audience draws together four components in the literature:

1. Knowledge of Creative Support
2. Knowledge of Culture
3. Knowledge of the Social
4. Knowledge of Teaching (Didactic).

This approach was taken to further understand Runco's (2014) statement that 'traditional education often stifles the creativity of students' (p.172). Measuring the actor's knowledge of their audience enables exploration of the links between this knowledge, their actions, their engagement, and their classroom culture.

4.7.2.1 Knowledge of Creative Support

The creative actor's perception of their social environment influences how they will respond to stimuli within that environment (Amabile, 1983; Bronfenbrenner, 2006). For a classroom to be supportive of creative thinking, many important conditions must be met (Baer & Kaufman, 2012; Barbot et al., 2011; Beghetto, 2013; Beghetto & Kaufman, 2014; Gajda et al., 2017; Sak, 2004). Supporting creative thinking in a classroom means encouraging creativity through fair and constructive feedback, rewarding and recognising creative ideas and products, and provision of structures that enable development of new ideas (Amabile et al., 1999; Shah & Ali, 2012). DiLiello and Houghton (2006) argued that practised creativity is a distinct but related concept to creative support, and that 'much can be done to enhance and maintain creativity by establishing stimulating, supportive, and positively challenging environments' (Amabile, 1996, p.262).

1. Rewards are given for creative ideas in my class.
2. Teachers understand my creative work.

3. I care about what my teachers think about my creative work.
4. People are encouraged to solve problems creatively in my classroom.
5. People are encouraged to take risks in my class.
6. People are recognised for their creative work in my class.
7. My creative ability is used to its full potential in class.

These prompts, based on DiLiello and Houghton's (2006) study, aim to measure student knowledge of creative support in their classroom, and the quality of that support. They measure the explicit promotion of creative ideas in class through rewards, whether students believe that their creativity is understood and valued by their teachers, and whether the classroom culture supports problem-solving and creative ideation.

4.7.2.2 Knowledge of the Culture

Culture is central to creative practice and performance since it provides opportunities for potential to be fulfilled (Runco, 2007). Clearly, creativity does not take place within a vacuum (Cohen, 2003; Lubart, 1990). If a classroom culture only values certain expressions of creativity from students, then only certain students will progress within that culture. Part of the difference in student behaviours amounts to variations in their perception of the culture. Students' knowledge of the culture will influence the nature of their relations with their teachers and peers. 'Cultural educational capital includes value systems, thinking patterns, models and the like, which can facilitate – or hinder – the attainment of learning and educational goals' (Ziegler & Baker, 2013, p.27). To measure students' knowledge of their classroom culture, the study adapted statements from Vladut et al.'s (2013) work on capital and its relations to excellence. as understood in the Actiotope Model:

1. Teachers at my school think being creative is important.
2. My peers think being creative is important.

3. My teachers show they value creative thinking by what they do.
4. My school encourages me to be creative.
5. The rules at my school encourage creative thinking.

Responses to these prompts aim to measure student perceptions of teacher and peers' values, alignment between actions and values, the school's cultural reinforcement of creative thinking, and the school's ethos.

4.7.2.3 Knowledge of the Social

Learning is shaped by the intellectual, social, and emotional experiences of the members of a given culture (Rueda, 2006). Bandura (1989), Vygotsky (1980), and Glăveanu (2015) highlight the importance of the 'other' as a source of knowledge, guidance, and perspective in learning situations, as well as in the creative process. 'Social educational capital includes all persons and social institutions that can directly or indirectly contribute to the success of learning and educational processes' (Ziegler & Baker, 2013, p.28). To measure students' knowledge of their social relations and social resources, the study adapted statements from Vladut et al.'s (2013) study of capital as understood in the Actiotope Model. Social educational resources include all individuals and social institutions contribute to the student's ability to be creative.

1. I receive support and advice for my creative thinking when I need it.
2. I know where I can find support and advice for improving my creativity.
3. My peers give me good advice on how I can further improve my creativity.
4. I have people in my life who are creative thinkers.
5. My role models are people who are creative thinkers.

Responses to these prompts aim to measure: the extent to which students are able to tap into social networks for social support with creative endeavours; the quality of their peer advice/social evaluations; their role models; and their vicarious experience of creative thinking in their interactions with creative others.

4.7.2.4 Knowledge of Teaching

Teachers are the gatekeepers of their classroom (Csikszentmihalyi, 1998; Csikszentmihályi, 1990). Many teachers use strategies that stifle creativity, even though they claim to value creativity (Karwowski, 2010), and are pedagogically closed in nature, using a narrow curriculum that emphasises testing instead of creativity (Collard & Looney, 2014; Fasko, 2001; Runco, 2014; Yoruk & Runco, 2014;). While teacher beliefs may never be explicitly stated, they manifest in the teacher's pedagogical and relational approach (Sternberg, 1990). Their beliefs, assumptions, and ideas about creativity, formed over many years, can stifle student and teacher creativity in the classroom (Beghetto, 2013). 'Didactic educational capital means the assembled expertise involved in the design and improvement of educational and learning processes' (Ziegler & Baker, 2013, p.29).

Five prompts were adapted from Vladut et al. (2013) to test student knowledge of the actions their teachers' take to extend their creative thinking, to provide opportunities for mastery, to create safe spaces for creativity, and to encourage creative thinking.

1. In the past, classroom teaching helped my creative thinking.
2. During class, I am taught how to be creative.
3. My teachers have helped me to keep improving my creativity.
4. My teachers are so good that I am confident to be creative in class.
5. My teachers encourage creative thinking in class.

4.7.3 Knowledge of Affordances

According to Ziegler (2005), performance of increasingly complex actions in a variety of complex environments will lead to *excellence* in that field as long as the action sequences are relevant/appropriate. In relation to creativity, it is widely accepted that a person's ability to solve problems and generate solutions may increase with practice where they have material opportunities (Guilford, 1977; Runco, 2003, Sternberg, 2006). Creativity from this dimension is a form of action that exploits the symbolic and material affordances to generate cultural artefacts. These artefacts are appreciated as new and useful by oneself and/or others (Glăveanu, 2014). Consequently, students will develop abilities consistent with the symbolic and material opportunities found in their environment. Many approaches to fostering creative thinking in classrooms assume that all students are creative in the same way. These approaches neglect difference in the classroom, starving some students of opportunities to practise their creativity. Knowledge of Affordances has 3 sub-components:

- Practised Creativity: Practised creativity may be defined as the 'perceived opportunity to utilise creativity skills and abilities' (DiLiello & Houghton, 2006 p.40).
- Economic component: every kind of wealth, possession, money, or valuables that can be invested in the initiation and maintenance of educational and learning processes (Vladut et al., 2013, p.44).
- Infrastructural component: all materially implemented possibilities for action that permit learning and education to take place (Vladut et al., 2013, p.44).

4.7.3.1 Practised Creativity

Practised creativity is defined as the 'perceived opportunity to utilise creativity skills and abilities' (DiLiello & Houghton, 2006, p.40). It differs from creative performance in that the latter is typically measured by reviewing and evaluating products or achievements (Hinton,

1968 Amabile, 1996). Classroom cultures that only value certain expressions of creative cognition limit creative practice and performance (Csikszentmihalyi, 1998; Ludwig, 1992) by determining how *potential* is translated into performance (Runco, 2007).

To measure student perceptions of opportunities to practise, a 5-point scale was adapted from DiLiello & Houghton's (2008) measure of practised creativity in the workplace. The scale used is as follows:

1. I have opportunities to use my creative skills and abilities during class.
2. I am invited to share my ideas or work in class.
3. I have the opportunity to create things with other people.
4. I have the freedom to decide how my school tasks get done.
5. I am more creative out of class than in class.

4.7.3.2 Economic resources

Bourdieu (1986) argued that cultural, social, and symbolic capital were disguised forms of economic capital (p.91). These other forms of capital can be transformed into economic capital, with economic capital then used to secure other forms of capital. 'Economic educational capital is every kind of wealth, possession, money or valuables that can be invested in the initiation and maintenance of educational and learning processes' (Ziegler & Baker, 2013, p.27).

1. I spend my money on things that help me to be creative.
2. My family has enough money to support my creative pursuits or hobbies.
3. I am concerned about how much money my family spends on my creative pursuits or hobbies.
4. My family spends money so I can be among the most creative students at school.
5. My school spends money so I have good conditions for being creative.

The five prompts above were adapted from Vladut et al., (2013) to test student knowledge of their familial economic capital, institutional economic capital, awareness and concern for family's economic status, and overt expenditure of school and family on creative materials.

4.7.3.3 Material Affordances: Infrastructural

'Infrastructural educational capital relates to materially implemented possibilities for actions that permit learning and education to take place' (Ziegler & Baker, 2013, p.28). This concept refers to the design of the physical space and material resources that are available (Beghetto & Kaufman, 2014). Surprisingly, many efforts to investigate creativity have not included the impact of environments (Richardson & Mishra, 2018). Secondary school art and design classrooms that provide material, technical, and reference resources are better able to facilitate creativity when these resources are available outside timetabled hours (Addison et al., 2010). Five prompts were adapted from Vladut et al. (2013) to measure student knowledge of their utilisation of the infrastructure in their classroom, school, and home, as well as measuring the quality and relevance of infrastructure at school.

1. I take full advantage of my school facilities to develop my creativity.
2. My classroom environment is well suited to being creative.
3. My school environment helps me to further improve my creativity.
4. My classroom environment helps me to further improve my creativity.
5. My home environment is well suited for creativity.

4.7.3.4 Knowledge of School Improvement

This study positions students as competent meaning-makers with significant insights into their learning and creative development at school. This approach is based on the notion of 'youth for consultation', prioritising students' experience and upholding their democratic right to be consulted about matters that affect them (Fielding, 2001). Wellbeing and

engagement with formal education are significantly influenced by the extent to which students have agency in their learning and a voice within the school (Black & Deci, 2000). Student knowledge can be used to improve service delivery or to inform the performance of schools and systems: **'**There is something fundamentally amiss about building and rebuilding an entire system without consulting at any point those it is ostensibly designed to serve' (Cook-Sather, 2002, p.3). These prompts aim to elicit general knowledge and beliefs about what works and what doesn't work in students' schools. They are open and are not necessarily aimed at a particular domain, hence their being left until last. Students may respond in relation to any of the five domains of creativity.

Participants were also asked to respond to the following questions:

- 'How can school become a place for you to be more creative?'
- 'How would you like school to be different?'

4.7.4 Knowledge of Artefacts: Domains of expression

To understand how engaged and disengaged students prefer to express their creativity, students were asked to respond to the question: 'How do you like to express your creativity?' Response options representing domains of expression at school included:

- Maths
- Natural Sciences
- Information and Communication Technology
- Arts
- Language and Writing
- Sports
- Humanities
- Social relations
- Music
- Other. Give Details Below.

These options were adapted from Heller's (2008) Munich Model of Giftedness and Gagne's Developmental Model of Giftedness and Talent (2004). These domains of expression are performance areas in which students prefer to practise and express their creativity. Students shared their knowledge of their domain preferences.

4.7.5 Implicit Theory of Creativity

To test the second hypothesis, the implicit theories of creativity held by both disengaged and engaged high ability students were examined. Contrasting studies that rely on expert definitions and theories of creativity, explicit theories, with implicit theories allows for personal definitions to emerge (Berg & Sternberg, 1992; Runco, 1999). Implicit theories are said to be conceptual rather than empirical, derived from a student's belief system (Runco & Bahleda, 1986). They are usually unrefined latent conceptions, yet to be explicitly stated but waiting to be discovered (Chan & Chan, 1999; Sternberg, 1985). Participants were also asked to respond to the following prompt:

- 'Write some words that you feel describe creativity.'

4.8 Procedure

Academic and Creative Action assessments and the Actor, Audience, and Affordances Questionnaire were administered in group sessions throughout the school year. For the Standardised assessments, students were instructed as set out in the SPM+ Assessment Manual. Students completed all assessments over three sessions, completing all assessments during regular school time. Individual assessments were untimed and were completed at different rates albeit within the provided times.

Completed assessments were collected, scored, and loaded into IBM SPSS statistics software. Scoring of the SPM+, MHV, and DTLA-4 was in accordance with their respective manuals. Scoring the questionnaire consisted of converting each student's responses to '1' for

Strongly Agree, all the way to '5' for Strongly Disagree. All questions were randomised and presented over 2 sessions. Since the participants were required to answer 126 questions, the questions were divided into 2 parts. Scoring of the creative assessment is detailed below. Each student wrote their responses, having been told that they would not be assessed for spelling. The below indicates the entire data collection sequence.

Table 9

Overview and Schedule of Assessments

Session	Type of activity	Amount of time activity will take	How they will be tested	**Total time:** 180 minutes
1	**Broken cup**	10 minutes approx.	Class group	Up to 70 minutes
	Raven's Standard Progressive Matrices	45 minutes approx.		
	Cultural Perception and Personality Assessment 1	15 minutes approx.		
2	**Cultural Perception and Personality Assessment 2**	15 minutes approx.	Class group	Up to 75 minutes
	MH Vocabulary Scale	15minutes approx.		
	Problem-solving task	35 minutes approx.		
	Alternative Uses	10 minutes approx.		
3	**Knowledge for School Improvement**	5 minutes approx.	Individually	Up to 35 minutes
	Detroit Test of Learning Aptitude 1. Reversed Letters 2. Word Sequences 3. Sentence Imitation 4. Design Sequences 5. Word Opposites	30 minutes approx.		

4.8.1 Assessment of Creative Outcomes[38]

The creative artefacts in this study were produced by the creative actors. The scoring criteria were developed from Munro's (2005, 2011, 2015) assessment of creative thinking and

[38] Tasks were described to the students. They were also able to ask questions to clarify.

social problem-solving in high ability students, Urban's TCT-DP (Urban, 2004), and Torrance's TCCT (Torrance, 1968, 1998). The measures used in the present study to identify creative actions, that is, divergent thinking, convergent thinking, critical thinking, and inferential thinking, inform the hypotheses by enabling students' creative outcomes to be assessed in verbal and figural forms. These scoring criteria are measures of performance, not ability, aptitude, or potential, and relate only to characteristics of creative thinking actions as defined in this study.

4.8.1.1 Creative Assessment 1: Social Problem-Solving Tasks

According to Munro (2011), Social Problem-Solving Tasks allow high ability students to show creative thinking actions such as divergent, critical, and inferential thinking by encouraging students to 'generate unexpected and unusual ideas and to be resourceful and adaptable in their thinking'. This approach differs from traditional psychometrics by using multiple criteria and non-traditional measures (Passow, 1986).

In this study the following prompt was used:

'We all know that good health is important for happiness. At your school there is a problem. There's a milk bar across the road that sells junk food. Many of the school students spend much more buying food from the milk bar than from the canteen. The healthy food in the canteen is usually cheaper. Also, your school makes money from the canteen. If your friends and other students eat well then this will help them be healthy.

Your school is asking you to suggest a creative way to get students to buy more of the more nutritious foods from the canteen and not the junk food from the milk bar.'

Students were given time to reflect then respond to the following questions:

1. What would be the best way to get students buying more nutritious foods from the canteen?

2. What difficulties do you think you would face?
3. What could you do to overcome these difficulties?
4. How do you know your suggestion would work?
5. Other than your school, who might be affected by your solution?

The quality of the responses to these five questions was assessed on the following dimensions:

1. the breadth and depth of ideas displayed;
2. the complexity of response;
3. the relevance and quantity of ideas;
4. the fluency and flexibility of reasoning;
5. sensitivity to social implications and consequences of their solution; and
6. elaboration of responses.

For each criterion, a response is scored based on its complexity. The complexity of a response is two-dimensional, that is, the quality of the ideas and the complexity of the thinking (literal or inferential, unidimensional or multidimensional). Full score card found for Social Problem-solving Task in Appendix C.

4.8.1.2 Creative Assessment 2: The Broken Cup

Alienated and marginalised high ability students often display low motivation or engagement while assessed in formal settings (Munro, 2011). This limits the researcher's ability to see all that these students can do and know. The broken cup gives students an open-ended and fun stimulus as it asks students to think about how the situation came to be. This task is similar to Torrance's *guessing causes and consequences* activity in the TTCT (Torrance, 1972).

In this study the following prompt was used in conjunction with a picture of the broken cup (Appendix D): 'What happened to the cup? You have found this cup. Describe how the cup might have come to be like this. Please list all the different ways you can think of. We encourage you to write down as many unusual and unexpected ways as you can, as well as more regular ways'.

Scoring for this task has 4 dimensions and is based on Munro (2011)*:*

1. **Fluency** = ability to generate responses on the broken cup task: Count total responses.
2. **Elaboration** = ability to generate elaborated responses on the broken cup task: total word count.
3. **Actional fluency:** number of things 'going on' in their responses, that is, verbs: the transformative actions involved in the breaking of the cup.
4. **Inferential** = ability to infer actions and contexts from the stimulus text and picture. The transformative action:

- Literal actions – the whole cup became parts, literally - dropped, thrown, laser or diamond cut; and
- Inferential actions – it has grown old, the two parts grew to be like this, split by a chemical reaction.

The context:

- Literal contexts of events: on table and fell off, child dropped it.
- Inferential context: the student hasn't accepted what they literally see. Responses included, for example, 'buried with person', 'stared at it', 'it's not a cup made of ceramic material', 'give it animate qualities', 'cup is an optical illusion'.

Scoring the inferential quality dimension involves analysing literal versus inferential thinking in the responses. Quality is determined by locating the response on the continuum below:

Points	*1 point*	*2 points*	*3 points*	*4 points*
Components assessed	Literal Action + Literal Context	Literal Context + Inferred Action	Literal Action + Inferred Context	Inferred Context + Inferred Action
Examples	It smashed	Looked at it for too long	Shot out of a cannon on ship	It is a piece of Postmodern art

4.8.1.3 : Picture Shape Game

Figural drawing production has a broad applicability, offering a culturally fair assessment in comparison with verbal measures (Urban, 2004). The figural stimuli provide a starting point for the students to express their creative thinking actions. These creative figural thinking actions were assessed according to 11 dimensions adapted from Urban's TCT-DP (Urban, 2004), and Torrance's TCCT (Torrance, 1968, 1998) to match the stimuli used in this study. These dimensions are as follows:

1. Modification: unfaithfulness to original design.
2. Elaboration into Space: any use of the space that occurs outside of the shape/s.
3. Continuations: any continuation or extension of the stimulus shape/s.
4. Humour or Affectivity: drawing prompts a humorous response, shows affection, emotional, or strong expressive power. Look for verbal and non-verbal cues such as emotive words and figural actions that convey emotion. When assessing humour, look for comical, funny, or amusing aspects in the drawing.
5. Connections made to produce a theme/storytelling: Drawing has produced a compositional theme or 'gestalt'. Discernible meaning has been produced. Synthesis of lines and objects into a coherent picture.
6. Movement or action: title, body posture, speech, change, transition.

7. Unusual Visualisation: present objects from unusual visual perspective such as above, underneath, unusual angle, inside, different distances, unusual position or relationship.
8. Fantasy: bends the rules of physics, fantastical, possible worlds, imagination.
9. Richness of imagery: variety, vividness, liveliness, intensity.
10. Perspective: any breaking away from two-dimensionality.
11. New elements: any new figure, symbol, or object.

Scoring involved awarding a drawing a value from 0 to 3. *0 Points* was awarded when the response did not reveal characteristics or behaviours associated as indicated on the matrix. This does not mean that the student is incapable of being creative but that their creative thinking actions are not yet evident in the assessed artefact. *1 point* was awarded when their creative thinking actions were limited in quality, inconsistent, or tentative. *2 points* were awarded when data indicated signs of high quality. Finally, *3 points* were awarded when data indicated performance with outstanding depth and quality (Treffinger et al., 2002). Full score card for Figural Drawing and prompts in Appendix E.

4.8.1.4 Creative Assessment 4: Alternative Uses task

Alternate Uses is a well-known divergent thinking test based on the Unusual Uses test design (Wilson et al., 1954). In the current study, each item was a well-known object, such as a brick, paperclip, or peg. The students were asked to list as many uncommon uses for the object as they could. This test was untimed, restricted only by how fast the students could work. The stimulus was a picture of the object.

Scoring involved a one-dimensional approach that counted fluency (that is, number of uses produced). With fluency, it is assumed that more responses represent divergent production in a simpler form even though research suggests divergent thinking may be more

convergent than many creativity theories presume (Nusbaum & Silvia, 2011). For this study, fluency is regarded as the number of responses given. It represents the raw generative power of the actor. Many researchers use only the fluency score to quantify divergent thinking performance (Batey et al., 2010; Preckel et al., 2006). This measure is a simple and focused way to look at generative ability that brackets culture by not assessing relevance, utility, or uniqueness. Uniqueness has not been assessed because it is sample-specific, and, as the sample size increases, the correlation between fluency and uniqueness increases (Nusbaum & Silvia, 2011). Scoring *Fluency* involved coding each response as 1. This dimension was focused on as a raw output of ideas, unlike the other dimensions which typically require more detailed cognitive treatment.

4.9 Data Organisation and Analysis

Qualitative and Quantitative data analysis methods were chosen so that the observed phenomena could be viewed from multiple perspectives. This approach is referred to as triangulation (Flick, 2004). Triangulation was possible given the multiple sources of data generated by the students (Table 10)

Table 10

Type of Analysis and Data source

Quantitative	**Qualitative**
Learning Action Assessments	Knowledge of School Improvement
Creative action Assessments	Implicit theories of creativity
Knowledge of the Actor Questionnaire	How do you like to show your creativity?
Knowledge of the Audience Questionnaire	
Knowledge of the Affordances Questionnaire	

With the literature review as the foundation of this approach, these methods provide different viewpoints from which the hypothesis can be investigated. Triangulation maximises the validity of the study as well as providing a basis for the justification of specific methods as means to generate new knowledge (Denzin, 1978; Denzin & Lincoln, 1995).

4.9.1 Qualitative Analysis

Qualitative analysis was used in this study to give students an opportunity to provide more detailed information about their views and beliefs. Ambrose et al. (2003) encourages a short answer approach when capturing individual uniqueness and when the situation is being examined through the participant's eyes. Further, students are positioned as deliberate and creative in their actions and as intentional meaning makers (Ambrose et al., 2003).

Three prompts were used to elicit students' knowledge of creativity and creative environments:

1. 'Write some words you feel describe creativity.'
2. 'How can school become a place for you to be more creative?'
3. 'How would you like school to be different?

A thematic analysis was conducted using codes and coding systems to identify themes pertinent to the hypotheses. This process involved thematic analysis as well as quantitative analysis using a computer-assisted data analysis tool called NVivo. Theory-driven coding involves codes derived from prior hypotheses or existing theory. The Five A's framework (Glăveanu, 2013) was applied to data in accordance with theory-driven coding techniques (Boyatzis, 1998). Additionally, Engagement and Ability categories were assigned to responses to enable in-depth comparisons.

4.9.2 **Quantitative Analysis:** analysis used and sample size justification

The sample size of this study (N=146) is large enough to ensure both a reasonable probability of any significant relationships being valid, and to ensure an avoidance of sampling error (Gravetter & Forzano, 2015 p.460). To test hypotheses 1 and 2, all scores were converted to Z scores, then learning profiles were generated. Students learning profiles were analysed using multiple statistical analysis.

The first stage of analysis involved factor analysis which requires a sample size larger than 100 (Hair et al., 2014 p.429). Factor analysis was used to determine latent constructs in the data and to assist with the process of synthesising multiple measures. Once these latent constructs were determined, Analysis of Variance (ANOVA) was used to test differences between multiple, predetermined categories based on engagement and ability. Comparison of these categories enabled inferences to be drawn about general rather than specific differences among means. Scheffé's method was used to assess all possible contrasts among the factor level means since this method gives narrower confidence limits and is a preferred method for the current study's research design (Hair et al., 2014). The final statistical procedures used for hypotheses 1 and 2 were cluster analysis and the chi-squared test. For a cluster analysis to be reliable, the sample size must be large enough to sufficiently represent small groups found within the population, and to sufficiently represent the underlying structure (Hair et al., 2014 p.429). Cluster analysis was used, in conjunction with the ANOVA, to look at similarities and differences found in latent clusters in the group and to explore and identify structures in the data. Finally, the chi-squared test was used to determine whether significant differences existed between the expected frequencies and the observed frequencies in the clusters and predetermined categories relating to engagement and ability.

To test hypothesis 3, Liner Regression Analysis was used to determine which set of variables was most likely to lead to displays of creativity in regular classrooms. Regression analysis was used to predict which independent variables were related to the dependent variable. To detect R^2 values of approximately 15 per cent and greater with 22 independent variables, a sample size of 130 to 150 is recommended (Hair et al., 2014 p.169).

Maxwell (1998) argues that utilising both qualitative and quantitative methods of data collection and analysis, 'provides a greater range of insights and perspectives and permits triangulation or the confirmation of findings by different methods, which improves the overall validity of results, and makes the study of greater use to the constituencies to which it was intended to be addressed' (p.4). To increase the accuracy of the tools, a pilot was run on the Broken Cup Task and Social Problem-Solving Task. The scoring criteria for the Broken Cup and Social Problem-Solving Task was refined through this process to increase inter-rater reliability, validity, trustworthiness, practicality, and effectiveness [39].

The current chapter described the methods used to investigate the hypotheses, including school selection and participant recruitment. Additionally, the procedure and the tools used in the data collection were explained. Finally, statistical analysis methods and justifications for these methods were described. The results of the data collection will be examined in the next chapter with reference to each hypothesis.

[39] Round 1 – 6 external coders with 10 tasks of each task i.e. Broken Cup and Social Problem Solving Task
Round 2 – 2 external coders with 10 tasks of each task i.e. Broken Cup and Social Problem Solving Task

Chapter 5
Results

5. Overview of the chapter

This chapter outlines the results for the present study[40]. As described in the methods chapter, the students' learning characteristics of participating students are analysed using the Five A's framework. This framework identifies 5 different domains of the learning profile, that is, Thinking Actions, Actor, Audiences, Affordances, and Artefacts. For each hypothesis, differences are reported, as is the extent of support for each hypothesis. The chapter will address the hypotheses in the following order:

1. Classroom Engaged students (CE) differ from Classroom Disengaged students (CD) and School Disengaged students (SD) in the following ways: specific Thinking Actions[41] (Learning and Creative Actions) and their perception of Actor, Audiences, and Affordances.
2. For High ability students, High Ability Engaged Students differ from High Ability Disengaged students and Average Ability students in the following ways: specific Thinking Actions[42] (Learning and Creative Actions) and their perception of Actor, Audiences, and Affordances.
3. Particular combinations of Cognitive Actions, Actor, Affordances, and Audience factors are more likely to lead to higher displays of Creative Actions.

5.1 Results for Hypothesis 1

Hypothesis 1: Classroom Engaged students (CE) differ from Classroom Disengaged students (CD) and School Disengaged students (SD) in the following ways: specific Thinking

[40] It is assumed that the data accurately represents what the student is able to do but not the best they can do.
[41] As discussed in section 2.5
[42] As discussed in section 2.5

Actions[43] (Academic Learning and Creative Actions) and their perception of Actor, Audiences, and Affordances.

5.1.1 Academic Thinking Actions of the Learning Profile

An exploratory factor analysis was undertaken to uncover the latent structure of seventeen measures of Academic Learning Actions. The exploratory factor analysis, orthogonal principal components analysis using Varimax rotation, produced 4 factors with 81% of the variance explained (Hair et al., 2014). The factor analysis identified four main Academic Action constructs: Sequential Thinking Actions, Verbal Thinking Actions, Complex Fluid Thinking Actions, and Basic Fluid Thinking Actions. The outcomes of the factor analysis are shown in table 11.

Table 11

Exploratory Factor Analysis for Academic Thinking Actions

17 Academic Action Measures	Factor Loading	Academic Action
1. DTLA_SS_TOTAL	.878	Sequential Thinking Actions
2. DTLA Quotient	.878	
3. WS Standard Score- DTLA Word Sequences (V)	.858	
4. SI Standard Score- DTLA Sentence Imitation (V)	.853	
5. RL Standard Score - DTLA Reversed Letters (NV)	.791	
6. DS Standard Score- DTLA Design Sequences (NV)	.530	
7. WO Standard Score - DTLA Word Opposites (V)	.503	
8. MH STANDARD SCORE	.882	Crystallised Thinking Actions
9. MH Part B	.814	
10. MH Part A	.753	
11. WO Standard Score - DTLA Word Opposites (V)	.618	
12. SPM SET E	.871	Complex Fluid Thinking Actions
13. SPM STANDARD SCORE	.793	
14. SPM SET D	.723	
15. SPM SET C	.672	
16. SPM SET A	.868	Basic Fluid Thinking Actions
17. SPM SET B	.838	

[43] As discussed in section 2.5

The extent to which the three categories of engagement differed in their use of Academic Actions was examined by using One-way ANOVA to compare their matching factor scores. The mean factor scores for each factor for each category (t-scores) are shown in Table 12. Comparisons between the three categories for each factor (Scheffé mean difference, I-J) and the level of significance are shown.

Table 12

Mean score of Academic Thinking Actions for engagement categories

	Engagement Category *n* =146						Scheffé mean difference, I-J		
Academic Thinking Actions	CE *n= 67*		CD *n= 39*		SD *n= 40*		CE with CD	CE with SD	CD with SD
	M	*SD*	*M*	*SD*	*M*	*SD*			
Sequential Thinking Actions	55.30	13.5	46.97	11.7	44.06	14.2	.83**	1.12**	.29
Crystallised Thinking Actions	52.31	8.78	49.07	9.39	47.01	11.6	.32	.53*	.20
Complex Fluid Thinking Actions[44]	53.36	10	48.05	8.05	46.25	10	.53*	.71**	.17
Basic Fluid Thinking Actions[45]	50.61	8.7	51.65	7.9	49.44	13.3	-.22	-.01	.22

* p< .05 ** p< .01

5.1.2 Results of ANOVA Examining Difference of Academic Thinking Actions of Engagement Categories

The three engagement categories differed in their Sequential Thinking Actions [F (2,143) = 10.318, p =.000], with the CE students scoring higher than the CD and SD students. They differed in their Crystallised Thinking Actions [F (2,143) = 3.896, p =.023], with the CE students scoring higher than the CD students. They differed in their Complex Fluid Thinking Actions [F (2,143) = 8.049, p =.000], with the CE cohort scoring higher than the CD and SD students. The categories did not differ in their Basic Fluid Thinking Actions.

[44] Raven's SPM+ sets C, D, & E

[45] Raven's SPM+ sets A & B

5.1.3 Factor Analysis of Creative Thinking Actions of the Learning Profile

Differences in the Creative Thinking Actions were examined by identifying the underlying structure of the fifty-three measures of creative actions using exploratory factor analysis and then comparing their outcomes on each component. Exploratory orthogonal principal components analysis, using Varimax rotation, identified 11 components and explained 75% of the variance (Hair et al., 2014). The outcomes are shown in Table 13.

Table 13

Exploratory Factor Analysis for Creative Thinking Actions

53 Creative Action Measures	Cor.	Creative Thinking Actions
1. Picture Shape - New elements 2	.811	F1 - Semi-Imposed Figural Thinking Actions 2
2. Picture Shape - Richness of imagery 2	.741	
3. Picture Shape - Connections made to produce a theme/Storytelling 2	.722	
4. Picture Shape - Continuations 2	.688	
5. Picture Shape - Elaboration into Space 2	.680	
6. Picture Shape - Perspective 2	.649	
7. Picture Shape - Unusual Visualisation 2	.647	
8. Picture Shape - Fantasy 2	.636	
9. Picture Shape - Movement or action 2	.610	
10. Picture Shape -Total Raw	.584	
11. Picture Shape - Modification of Shape 2	.545	
12. Social Problem-Solving Task_TOTAL_ELAB	.920	F2 – Verbal generative ability
13. Social Problem-Solving Task_Q3_B_ELAB	.796	
14. Social Problem-Solving Task_Q5_B_ELAB	.766	
15. Social Problem-Solving Task_Q2_B_ELAB	.752	
16. Social Problem-Solving Task_Q1_D_ELAB	.727	
17. Social Problem-Solving Task_Q4_C_ELAB	.725	
18. Picture Shape - Richness of imagery 1	.769	F3 - Open Figure Thinking Actions 1
19. Picture Shape - Unusual Visualisation 1	.756	
20. Picture Shape - New elements 1	.756	
21. Picture Shape - Fantasy 1	.724	
22. Picture Shape - Elaboration into Space 1	.693	
23. Picture Shape - Connections made to produce a theme/Storytelling 1	.686	
24. Picture Shape - Movement or action 1	.621	
25. Picture Shape - Continuations 1	.579	
26. Picture Shape - Perspective 1	.577	

27.	Picture Shape - Elaboration into Space 3	.790	F4 - Imposed
28.	Picture Shape - Connections made to produce a theme/Storytelling 3	.687 .668	Figural Thinking
29.	Picture Shape - Richness of imagery 3	.664	Actions 3
30.	Picture Shape - New elements 3	.623	
31.	Picture Shape - Unusual Visualisation 3	.598	
32.	Picture Shape - Fantasy 3	.575	
33.	Picture Shape - Continuations 3		
34.	BC_Overall Literal/Inferential Score	.868	F5 –
35.	BC_TOTAL_VERBS	.865	Inferential
36.	BC_Overall Fluency - Total responses	.832	Thinking
37.	BC_Elaboration of responses (Total word Count)	.710	Actions BC – general
38.	AU_1_Fluency_PC	.859	F6 -
39.	AU_1_Fluency_BRICK	.840	Divergent
40.	AU_1_Fluency_PEG	.779	Thinking Actions (fluency on Alternative uses)
41.	Social Problem-Solving Task_Q1_A_INFER	.715	F7 –
42.	Social Problem-Solving Task_Q1_B_COMPLEXITY	.669	Inferential
43.	Social Problem-Solving Task_Q1_C_QUANT_PLAUSIBLE_IDEAS	.606	Thinking Social Domain
44.	Picture Shape - Humour and Affectivity 1	.705	F8 – Humour
45.	Picture Shape - Humour and Affectivity 3	.578	and
46.	Picture Shape - Humour and Affectivity 2	.536	Affectivity in Picture Shape Tasks
47.	BC_Elaboration divided by fluency	.846	F9 –
48.	BC_MEAN_INFERENTIAL_SCORE	.753	Inferential Thinking Actions per response on Broken Cup
49.	Social Problem-Solving Task_Q2_A_QUANT RELEVANT_DIFFICULTIES	.620 .558	F10 - Critical/Evalu
50.	Social Problem-Solving Task_Q2_B_COMPLEXITY	.508	ative
51.	Social Problem-Solving Task_Q3_B_COMPLEXITY		Thinking Actions
52.	Social Problem-Solving Task_Q4_A_COMPLEXITY	.612	F11-
53.	Social Problem-Solving Task_Q4_B_QUANT_PLAUSIBLE_IDEAS	.571	Conditional Thinking Actions

5.1.4 Results of ANOVA Examining Differences of Creative Thinking Actions between Engagement Categories

The factor analysis scores were analysed using One-way ANOVA to examine the extent to which student performance of creative actions differed across the three levels of engagement. The mean z-scores for each factor were converted to t-scores and are shown for each category of engagement in table 14.

5.1.5 Factor Analysis of Non-Cognitive Factors of the Learning Profile

Students' perceptions of themselves, affordances and their audience l were assessed using a questionnaire[46] comprising eighty-one items. To investigate the extent to which engaged and disengaged students' learning profiles differ, an exploratory factor analysis was undertaken to uncover the underlying categories in the data[47]. The exploratory factor analysis produced twenty-eight factors with 75% of the variance explained; however, 10 of these factors were omitted due to single loadings (Hair et al., 2014). The outcomes of the factor analysis procedures (orthogonal principal components analysis using Varimax rotation) are shown in table 15.

[46] Perceptions of personal, social, and environmental resources.

[47] The questionnaire is a combination of many used and validated scales. These were combined to give a comprehensive picture of students' perceptions of their environment. 14 questions were excluded due to irrelevance.

Table 14

Mean Comparisons for Engagement Categories on Creative Thinking Actions

	Engagement Category *n= 136*						One-way AVOVA, Scheffe mean difference (I-J)			
	CE *n=67*		CD *n=37*		SD *n=32*		F (2,133)	CE vs CD	CE vs SD	CD vs SD
Creative Thinking Actions	*M*	*SD*	*M*	*SD*	*M*	*SD*				
F1 - Semi-Imposed Figural Thinking Actions	51.4	8.77	47.97	11.71	49.28	10.09		.34	.21	-.13
F2 – Verbal generative ability (Verbal Elaboration)	52.35	9.76	50.57	10.90	44.40	7.07	7.591**	.17	.79**	.61*
F3 - Open Figure Thinking Actions 1	49.93	11.03	50.09	8.98	50.01	9.08		-.01	-.01	.01
F4 - Imposed Figural Thinking Actions; ability to generate creative responses on the constrained drawing task	52.07	9.63	49.25	9.71	46.52	10.27	17.216**	.28	.55*	.27
F5 – Inferential Thinking Actions BC – general	53.75	11.47	48.02	6.92	44.44	5.74	12.094**	.57*	.93*	.35
F6 - Divergent Thinking Actions (fluency on Alternative uses)	51.81	12.04	49.18	6.44	46.74	6.94		.26	.50	-.24
F7 – Inferential Thinking Social Domain	50.57	10.06	49.05	8.15	49.92	11.88		.15	.06	-.15
F8 – Humour and Affectivity in Picture Shape Tasks	51.16	11.26	48.99	8.20	48.74	9.03		.21	.24	0.2
F9 – Inferential Thinking Actions per response on Broken Cup	51.29	9.82	48.91	9.65	48.57	10.73		.23	.27	.03
F10 - Critical/Evaluative Thinking Actions	50.76	9.82	49.21	9.23	49.33	11.35		.15	.14	-.01
F11- Conditional Thinking	50.23	9.37	51.23	10.67	48.09	10.51		-.09	.21	.31
Total Display of Creative Actions[48]	54.08	8.19	48.72	9.07	42.92	10.36	17.216**	.53*	1.1**	.57*

* p< .05 ** p< .01

[48] Factor 1 - PS_ Figural_2 SIMULTANEOUS_IMAGERY, Factor 2 - Verbal_generative_ability, Factor 3 - PS_ Figural_1 SIMULTANEOUS_IMAGERY, Factor 4 - PS_ Figural_3 SIMULTANEOUS_IMAGERY, Factor 5 - BC_total inferential score, Factor 6 - Divergent Thinking Actions via fluency, Factor 7 - PROBLEM_DETECTING_SOCIAL_integrative, Factor 8 - HUMOUR_AND_AFFECTIVITY_FIGURAL, Factor 9 - INFERENTIAL_THINKING_impact per response on broken cup, Factor 10 - Critical/Evaluative Thinking, Factor 11- KNOWLEDGE_CONDITIONAL_THINKING

Table 15

Exploratory Factor Analysis for Actor, Affordance, Audience Questionnaire

Items	Factor Loading	Component
1. My school environment helps me to further improve my creativity	.775	F1 - Perception of classroom
2. My teachers are so good that I am confident to be creative in class	.752	as a positive creative culture
3. My classroom environment helps me to further improve my creativity	.749	
4. My teachers have helped me to keep improving my creativity	.746	
5. My teachers encourage creative thinking in class	.744	
6. My school encourages me to be creative	.743	
7. My teachers show they value creative thinking by what they do	.733	
8. My classroom environment is well suited to being creative	.700	
9. Teachers at my school think being creative is important	.678	
10. My school spends money so I have good conditions for being creative	.669	
11. The rules at my school encourage creative thinking	.621	
12. I receive support and advice for my creative thinking when I need it	.592	
13. During class, I am taught how to be creative	.552	
14. I know how to get ready to be creative in class	.460	
15. I have opportunities to use my creative skills and abilities during class	.460	
16. In the past, classroom teaching helped my creative thinking	.431	
17. People are recognised for their creative work in my class	.422	
18. I want to be one of the most creative at school	.720	F2 – Creative drives and goals
19. An important goal for me is being creative at school	.716	
20. I aim to improve my creative ability at school	.715	
21. I like to be creative in class for long periods of time	.625	
22. My role models are people who are creative thinkers	.616	
23. I feel that being creative will help me grow as a person	.573	
24. When I want to improve my creativity, I can practise for a long time without getting tired	.456	
25. I practise being creative so I become really good at it	.453	
26. I spend my money on things that help me to be creative	.416	
27. I have an idea about what my next creative project will be (doesn't have to be at school)	.414	
28. My thoughts are often highly creative	.414	

29. I know from experience how I can use my creative thinking to achieve my goals	.713	F3 – Knowledge of how to be creative (Prior Experiences Facilitate Creative Growth)
30. I know how to think creatively in lots of ways	.639	
31. I already have a lot of experience on how to be creative	.611	
32. I know from experience how I can improve my creativity	.605	
33. I already have a lot of experience about when, how, and where I can be creative most effectively	.573	
34. I know what I need to learn to be more creative	.524	
35. I plan when, how, and where I will be creative	.473	
36. I can tell when and how it is best to be creative in class	.457	
37. When I'm in class, I listen very carefully	.775	F4 – Behavioural engagement with the classroom culture
38. I work hard to do my best in class	.739	
39. NEG - I don't care if I get into trouble for not doing schoolwork (Inverse)	-.553	
40. I want to learn as much as I can in school	.511	
41. I frequently have difficulties starting to do things (Inverse)	-.474	
42. I often have the urge to break or smash things	.810	F5 – Impulsive non- conformity
43. I often have an urge to hit someone	.810	
44. I am easily distracted from work by daydreams	.572	
45. I often feel like doing something shocking or controversial	.531	
46. School is one of my favourite places to be	.746	F6 – school engagement/ positive connection
47. I find school fun and exciting	.687	
48. I feel happy to be part of school	.636	
49. Overall, I feel good about being in this school	.630	
50. My good health helps me to be creative	.770	F7 – positive physical heath
51. My physical health is so good that I can even concentrate on difficult subject matter for a long time	.583	
52. My creative thinking makes me feel physically healthy	.528	
53. People in my daydreams seem so true to life that I sometimes think they are real	.745	F8 – unusual perception/magical thinking
54. My fantasies and dreams can seem as real as actual events in my life	.736	
55. People expect me to be creative so I am	.509	
56. I suddenly feel distracted by distant sounds that I am not normally aware of	.446	
57. When it is dark, I see shapes and forms even though there's nothing there	.426	
58. I am good at finding creative ways to solve problems	.792	F9 – creative self-efficacy
59. I have confidence in my ability to solve problems creatively	.666	
60. I am good at expanding other people's ideas	.413	

61. I have the freedom to decide how my school tasks get done	.692	F10 - Time and space in class
62. NEG - I never have enough time to be creative in class (Inverse)	-.665	to be creative
63. My creative ability is used to its full potential in class	.526	
64. I have the opportunity to create things with other people	.728	F11 – Opportunity to be
65. I have opportunities to use my creative skills and abilities during class	.427	creative in class
66. NEG - I don't care about what my teachers think about my creative work	.740	F12 – Creative activity is
67. NEG - Teachers don't understand my creative work	.665	disconnected from audience
68. I am creative so others will like me more	.818	F13 – Extrinsic motivation -
69. I am creative because other people think it is something worth doing	.639	Self – (Gain)
70. My mood goes up and down easily	.763	F14 - emotional
71. I am creative so that other people can be creative too	.436	sensitivity/stability
72. My creativity makes my friends and classmates happier	.791	F15 – Extrinsic-Others (Giving
73. I am creative to help other people	.432	and Guidance)
74. I want to learn as much as I can in school	.412	F16 – Emotional Engagement
75. I feel comfortable trying out new ideas in class	.476	with Classroom learning
76. My family has enough money to support my creative pursuits or hobbies	.774	F17 – Family Economic capital
77. My family spends money so I can be among the most creative students at school	.431	
78. The tests in my classes do a good job of measuring what I'm able to do (Inverse)	-.604	F18 – Perceived mismatch with
79. When I'm in class, I just act like I'm working	.561	classroom culture

5.1.6 Results of ANOVA Examining Differences Between Non-Cognitive Factors of Engagement Categories

The factor analysis scores were analysed using One-way ANOVA to examine the extent to which the three levels of engagement differed in their perception of resources/Affordance, Audience questionnaire. The mean factor scores (t-scores) for each factor for each category of engagement are shown in Table 16. Comparisons between the three categories for each factor (Scheffé mean difference, I-J) and the level of significance are shown.

5.1.7 Results of Initial Cluster Analysis

Hierarchical cluster analysis was used to identify learning profiles within the cohort. This analysis indicated a model of 6 latent clusters to be most representative of the diversity in the cohort. This model showed optimal diversity between clusters while maintaining representative group sizes, since the same groups have smaller representations in a school cohort; for example, exceptionally gifted students are said to be only 1 or 2% of the general population. Hierarchical cluster analysis followed by K-means cluster analysis was used to compare the 6 groups on the various components. Results of this analysis are shown in Table 17.

Similarities and differences between the clusters were examined using one-way analysis of variance procedures. Comparisons between the 6 clusters for each factor (Scheffé mean difference, I-J) and the level of significance were used to analyse the relative strengths and weaknesses of each cluster.

Table 16

Mean and Standard Deviations of Engagement Categories on Actor, Affordance, Audience Components

Actor, Affordance, Audience Components	Engagement Category *n= 146*										
	CE *n= 67*		CD *n= 39*		SD *n= 40*				One-way AVOVA, Scheffé mean difference (I-J)		
	M	*SD*	*M*	*SD*	*M*	*SD*	F (2,133)		CE vs CD	CE vs SD	CD vs SD
F1 - Perception of classroom as a positive creative culture	50.48	9.67	54.84	10.40	44.48	7.28	12.43**		-.4	.60**	1.03**
F2 – Creative Drives and Goals	49.37	9.39	49.78	11.68	51.27	9.34			-.04	-.19	-.14
F3 – Knowledge of how to be creative	50.02	9.32	51.22	10.57	48.78	10.63			-.11	.12	.24
F4 – Behavioural Engagement with The Classroom Culture	47.30	8.76	53.24	10.68	51.37	10.29	5.143	.007	-.59*	-.40	.18
F5 – Impulsive Non- conformity	52.54	7.84	46.67	11.13	48.99	11.13	4.522	.010	.58*	.35	-.23
F6 – School Engagement/ Positive Connection	48.60	7.58	55.38	11.13	47.09	10.63			-.67**	.15	.82**
F7 – Positive Physical Heath	48.27	9.00	52.63	9.54	50.33	11.57			-.43	-.20	.22
F8 – Unusual Perception/Magical Thinking	48.44	9.16	51.73	10.03	50.92	11.12			-32	-.24	.08
F9 – Creative Self-Efficacy	50.85	9.23	50.54	10.13	48.05	11.06			.03	.27	.24
F10 - Time and space in class to be creative	52.06	10.56	49.84	9.17	46.71	9.09	3.727	.026	.22	.53*	.31
F11 – Opportunities to practise being creative in class	49.28	9.09	50.83	9.90	50.40	11.61			-.15	-.11	.04
F12 – Disconnected from Creative Audience	50.14	9.39	50.20	8.65	49.57	12.22			-.01	.05	.06
F13 – Extrinsic motivation	51.05	10.07	50.96	10.61	47.29	8.95			.01	.37	.36
F14 - Emotional Sensitivity	51.83	9.90	48.60	9.57	48.30	10.31			.32	.35	.02
F15 – Extrinsic-Others (Giving and Guidance)	50.61	11.02	47.74	9.91	51.17	7.97			.28	-.05	-.34
F16 – Emotional Engagement with Classroom learning	48.31	9.71	51.84	10.05	51.04	10.22			-.35	-.27	.07
F17 – Family Economic capital	48.89	9.75	48.12	8.38	53.69	11.09	3.987	.021	.07	-.48	-.55*
F18 – Perceived mismatch with Classroom Culture	52.43	7.69	46.91	10.00	48.93	12.39	4.255	.016	.55*	.35	-.20

* p< .05 ** p< .01

Table 17

Final Cluster Centres and ANOVA

Factors	Cluster						ANOVA	
	1	2	3	4	5	6	F	Sig
	45	7	4	48	18	3		
Crystallised Thinking Actions	.06	.71	-.58	.34	-.92	-1.45	8.32	.000
Complex Fluid Thinking Actions	-.27	.56	-.62	.55	-.46	-.401	5.90	.000
Basic fluid Thinking Actions	.24	-.16	-3.71	.14	-.40	.92	25.69	.000
Sequential Thinking Actions	.09	-.10	-1.04	1.09	-1.95	-1.21	27.24	.000
F10 - Critical/Evaluative Thinking Actions	-.04	-.16	-.52	.09	-.42	.28	.96	.45
F1 – Semi-Imposed Figural Thinking Actions 2	-.48	-.05	.44	.42	-.261	.77	5.00	.000
F3 - Open Figure Thinking Actions 1	.09	-.03	-.52	.26	-.47	-1.44	3.11	.011
F4 - Imposed Figural Thinking Actions 3	-.01	-.79	-.65	.30	-.39	.15	2.67	.025
F2 – Verbal generative ability	-.13	-.85	-.33	.547	-.41	-.749	5.83	.000
F5 – Inferential Thinking Actions BC – general	-.26	2.86	-.36	.19	-.38	-.07	25.16	.000
F7 – Inferential Thinking Social Domain	-.21	.07	-.64	.46	-.53	-.61	4.67	.001
F8 – Humour and Affectivity in Picture Shape Tasks	.03	-.11	.69	.15	-.23	-.19	.78	.567
F6 - Divergent Thinking Actions (fluency on Alternative uses)	-.25	.69	-.81	.31	-.29	.07	3.22	.009
F11- Conditional Thinking Actions	.03	.33	-.54	.08	-.79	1.56	5.23	.000
F9 – Inferential Thinking Actions per response on Broken Cup	-.19	.06	.13	.21	-.39	.85	1.88	.102
Total Display of Creative Actions	-.31	.52	-.73	.87	-1.35	.05	36.41	.000
FA1 - Perception of Positive Creative Culture	.08	-.12	.40	.20	-.22	-.53	.81	.547
FA2 – Creative Drives and Goals	.28	.51	1.15	-.53	.07	.24	6.16	.000
FA3 – Prior Experiences Facilitate Creative Growth	-.06	.21	-.70	-.04	-.05	1.08	1.26	.288
FA4 – Behavioural Engagement with The Classroom Culture	-.12	.20	.34	.02	.15	.11	.36	.876
FA5 – Impulsive Non-Conformity	-.02	.51	.31	.25	.02	-.49	.92	.473
FA6 – School Engagement/Positive Connection	.06	.06	-.42	.01	-.08	.28	.28	.923
FA7 – Positive Physical Heath	.29	.22	-.91	-.25	-.39	.67	3.53	.005
FA8 – Unusual Perception/Magical Thinking	.38	-.14	-1.16	-.27	.29	-1.47	5.06	.000
FA9 – Creative Self-Efficacy	.21	-.29	.99	-.01	-.70	-.54	4.06	.002
FA10 - Time and space in class to be creative	-.13	.22	-.40	.10	-.23	.46	.68	.641
FA11 – Opportunities to practise being creative in class	-.03	.28	.76	-.17	.22	1.39	2.43	.039
FA12 – Disconnected from Creative Audience	-.11	.13	.40	.12	-.06	-.86	.86	.509
FA13 – Extrinsic - Self – (Gain)	.34	-.56	-.12	-.01	-.70	.87	3.96	.002
FA14 - Emotional Sensitivity	-.15	.54	.13	.08	-.20	.84	1.28	.276

FA15 – Extrinsic-Others (Giving and Guidance)	-.05	-.72	-.36	.10	.33	-.54	1.56	.178
FA16 – Emotional Engagement with Classroom learning	.14	-.00	-.12	-.03	-.20	-.45	.49	.782
FA17 – Family Economic capital	.29	-.67	.15	-.22	-.43	1.43	4.15	.002
FA18 – Perceived mismatch with Classroom Culture	-.16	.12	.25	.19	-.12	.39	.85	.516

Final Cluster distances show that clusters 1 and 4 are most similar whereas clusters 2, 3, 4, and 6 are most different from each other (>6): see table 21below for all final cluster distances.

Table 18

Distance between final cluster centres

Cluster	1	2	3	4	5	6
1						
2	**4.284**					
3	**5.358**	**6.419**				
4	**2.820**	**4.029**	**6.127**			
5	**3.434**	**5.294**	**4.875**	**5.014**		
6	**5.035**	**6.063**	**6.998**	**5.766**	**5.607**	

Cluster group membership by gender and engagement are given in table 19. The Chi-square test shows there was a significant association between cluster membership and engagement ($X^2(10) = 30.18$, $p < .001$). Since the p-value is less than our chosen significance level, $\alpha = 0.05$, there is an association between cluster membership and engagement. Further, the Chi-square test showed there was a significant association between cluster membership and gender ($X^2(5) = 19.37$, $p < .002$). Since the p-value is less than our chosen significance level, $\alpha = 0.05$, there is an association between cluster membership and gender. Sample characteristics are given in table 20, and detailed descriptions of the clusters are given below.

Table 19

Cluster groups' Engagement and Domain of Ability

		Cluster						
		1	*2*	*3*	*4*	*5*	*6*	*Total*
Engagement		*n*=45	*n*=7	*n*=4	*n*=48	*n*=18	*n*=3	*n*=125
	CE	17 (.26)	5 (.07)	3 (.04)	36 (.60)	3 (.04)	1 (.01)	65
	CD	17 (.53)	1 (.03)	0	8 (.25)	5 (.16)	1 (.03)	32
	SD	11 (.39)	1 (.04)	1 (.04)	4 (.16)	10 (.36)	1 (.04)	28
Gender								
	Female	21	1	0	31	3	1	57
	Male	24	6	4	17	15	2	68

Table 20

Categorical Representation of Cluster Group Characteristics

	Cluster					
Dimensions	**1**	**2**	**3**	**4**	**5**	**6**
Actions						
Academic Thinking Actions						
Crystallised Thinking Actions	**M**	**H**	**L**	**H**	**L**	**VL**
Complex Fluid Thinking Actions	**L**	**H**	**L**	**H**	**L**	**L**
Basic fluid Thinking Actions	**M**	**M**	**VL**	**M**	**L**	**H**
Sequential Thinking Actions	**M**	**M**	**VL**	**VH**	**VL**	**VL**
Creative Thinking Actions						
Semi-Imposed Figural Thinking Actions 2	**L**	**L**	**H**	**H**	**L**	**H**
Open Figure Thinking Actions 1	**M**	**M**	**M**	**H**	**L**	**VL**
Imposed Figural Thinking Actions 3	**M**	**L**	**L**	**H**	**M**	**H**
Verbal generative ability	**M**	**L**	**M**	**H**	**M**	**L**
Inferential Thinking Actions BC – general BC	**L**	**VH**	**L**	**M**	**L**	**L**
Social Problem Detecting/Inferential Thinking Quality	**L**	**M**	**L**	**H**	**L**	**L**
Divergent Thinking Fluency	**L**	**H**	**L**	**H**	**M**	**M**
Conditional Thinking Actions	**M**	**H**	**L**	**M**	**L**	**VH**
Total Display of Creative Actions	**L**	**H**	**L**	**H**	**VL**	**M**
Audience						
Perception of Positive Creative Culture*	**L**	**M**	**L**	**L**	**M**	**H**
Extrinsic-Others (Giving and Guidance) *	**L**	**H**	**H**	**L**	**L**	**H**
Perceived mismatch with Classroom Culture*	**M**	**M**	**L**	**M**	**M**	**L**
Actor						
Behavioural Engagement with The Classroom Culture*	**M**	**M**	**L**	**M**	**M**	**M**
Creative Drives and Goals	**M**	**M**	**L**	**H**	**M**	**M**
Positive Physical Heath	**M**	**M**	**H**	**H**	**H**	**L**
Unusual Perception/Magical Thinking	**M**	**H**	**VH**	**H**	**M**	**VH**
Creative Self-Efficacy	**M**	**H**	**L**	**M**	**H**	**H**
Extrinsic - Self – (Gain)	**L**	**H**	**H**	**M**	**H**	**L**
Affordances						
Time and space in class to be creative*	**M**	**L**	**M**	**H**	**M**	**L**
Opportunities to practise being creative in class	**M**	**L**	**L**	**H**	**L**	**VL**
Family Economic capital	**M**	**H**	**L**	**H**	**M**	**VL**

*non-significant dimensions included in the learning profile

The cluster names are intended to reflect the comparative cognitive and creative aspects of the students' learning profiles.

Description of Cluster 1: Average academic learning, including sequential thinking, low creative thinking actions

- Distribution of Classroom Engaged (*n*= 17), Classroom Disengaged (*n*= 17), and School Disengaged (*n*= 11).
- Highest on Basic Fluid Thinking Actions.
- Average on Sequential Thinking Actions, Crystallised Thinking Actions, and Complex Fluid Thinking Actions.
- Total quality of Creative Actions is low. Strengths include figural drawing, generating verbal responses to imagery and text prompts, and social inferential thinking.
- Self-knowledge of their attributes: moderate beliefs in their creative self-efficacy, unusual thinking, creative goals and drives, and links between creativity and positive physical health, intrinsic motivation high.
- Moderate on affordances such as economic capital and their perception of alignment with the audience in terms of the opportunities to work collaboratively with their peers and use their creativity in class.
- Most similar to cluster 4, most different from 3 and 6.

Description of Cluster 2: High academic learning, low sequential thinking, high creative thinking actions

- Distribution of Classroom Engaged (*n*= 5), Classroom Disengaged (*n*= 1), and School Disengaged (*n*= 1)[49].

[49] It is important to note that the cluster analysis has been used to maximise the range of difference found in the cohort. While smaller clusters might be seen as outliers in other study designs, within this study, these clusters have been retained through the analysis to highlight the nuance within the cohort and maintain diversity.

- Academic and Creative actions at a high level, that is, Inferential thinking, Crystallised thinking, Complex Fluid Thinking, Divergent Thinking, Conditional Thinking, as well as scoring high on Total Creative Actions.
- High self-efficacy, unusual perception, extrinsic motivation, and economic capital.
- Perceive low opportunities in classroom.
- Low ability to generate high volume texts and figural drawing.
- This cluster is different from all other clusters (>4).

Description of Cluster 3: Low academic learning, low creative thinking actions

- Distribution of Classroom Engaged (*n*= 3) and School Disengaged (*n*= 1).
- Very low/low level on Academic and Creative action assessments with the exception of open figural drawing.
- Very high unusual perceptual experiences (only cluster 6 is higher).
- High positive physical health.
- High extrinsic motivation.
- Perceives low affordances for their creative development at school or at home.

Description of Cluster 4: High academic learning, high sequential thinking, high creative thinking actions

- Largest cluster (*n*= 48) and an unequal distribution of male (*n*= 17) and female (*n*= 31).
- Engagement distribution: Classroom Engaged (*n*= 36), Classroom Disengaged (*n*= 8), and School Disengaged (*n*= 4).
- High level: Crystallised thinking, Complex Fluid thinking, Total creative actions: Figural Drawing, Verbal generative ability, Social Problem Detecting/Inferential Thinking Quality, Divergent Thinking Fluency, and Total Display of Creative Actions.
- Very high level: Sequential thinking.
- High levels of self-efficacy, physical health, economic capital, and creative goals and drives.

- This group did not rate low on any dimension. This cluster is most different from 2, 3, 5, and 6 (>4).

Description of Cluster 5: Low academic learning, low creative thinking actions

- Distribution of Classroom Engaged (*n*= 3), Classroom Disengaged (*n*= 5), and School Disengaged (*n*= 10) with a total of 18[50].
- Lowest level of Sequential Thinking Actions and Total Display of Creative Actions.
- Low in verbal[51], non-verbal, and figural domains.
- Cluster reported high levels of extrinsic motivation, physical health, and creative self-efficacy.
- This cluster is most similar to cluster 1 and most different from 2, 4, and 6.

Description of Cluster 6: Unusual learning profile

- Distribution of Classroom Engaged (*n*= 1), Classroom Disengaged (*n*= 1), and School Disengaged (*n*= 1).
- Very low Crystallised Thinking Actions and Sequential Thinking Actions.
- High Basic fluid Thinking Actions.
- Low Complex Fluid Thinking Actions.
- Very high-level conditional thinking and Figural drawing tasks.
- High levels of unusual perception and self-efficacy.
- Moderate levels of divergent thinking, total creative actions, and Creative Drives and Goals.
- Low extrinsic Motivation, low perception of opportunities in class, low economic capital, and low physical health.
- This cluster is different from all other clusters (>5).

[50] Distribution of male (*n*= 15) and female (*n*= 3)

[51] Elaborated work, albeit the quality was low as measured in the Creative Action Assessments.

5.1.8 Expression of creativity by Classroom Engaged and Disengaged Students (domain specificity of Artefacts).

To understand how engaged and disengaged students prefer to express their creativity, student responses to multiple-choice questions were analysed for frequency of responses and percentages. Engaged students report that, while they express their creativity in multiple domains, academic subjects, Natural Sciences (63%), Music (62.5%), Maths (61.7%), Language and Writing (58%) were in the majority. For the disengaged students, pursuits in the 'Other' category (88%), such as fashion, gardening, exploring the world, making and fixing things, cooking, discussion, theatre, street art, and photography, were nominated as avenues through which they expressed their creativity. Additionally, disengaged students selected Humanities (60.9%), Social Relations (58.7%), Sports (58%), Arts (54.7%), and Information and Communication Technology (ICT) (52.5%) as their preferred domains of creative expression. Results are presented in Table 21.

5.2 Results for Hypothesis 2

Hypothesis 2: For high ability students, the academic and creative actions differ between engaged students and their disengaged peers and average ability students. Further to this, it is hypothesised that the High Ability Engaged (HAE) group perceive the artefacts, actor attributes, audiences, and affordances differently to their disengaged peers**.** For this analysis, the class and school disengaged cohorts are combined into a high ability disengaged group. The two high ability groups' data are compared with the data for their Average Ability (AA) peers.

Table 21

Percentages of responses for engagement category

	Engaged	Disengaged	
Domains of Creative Expression	*N=66*	*N=79*	*Total number of responses*
Natural Sciences[#]	63%	37%	27
Music[+]	62.5%	37.5%	16
Maths[#]	61.7%	38.3%	34
Language and Writing[#]	58%	42%	60
ICT[+]	47.5%	52.5%	59
Arts[+]	45.3%	54.7%	97
Sports[+]	42%	58%	60
Social Relations[$]	41.3%	58.7%	58
Humanities[#]	39.1%	60.9%	23
Other[$]	12%	88%	25

[#]Traditionally Academic Subjects
[+]Non-Academic School Subjects
[$] Non-school Subjects such as fashion, gardening, exploring the world, making and fixing things, cooking, discussion, theatre, street art, and photography.

5.2.1 High Ability Students' implicit theories of creativity focus on creative actions.

The implicit theories of creativity held by both disengaged and engaged high ability students were examined using deductive thematic analysis to analyse their responses to the prompt: 'Write some words that you feel describe creativity'. Each student's response was coded in line with the Five A's framework (Glăveanu, 2013, p.257), and descriptive analysis was conducted using NVivo. The mean percentage of reference for each component of the Five A's framework for each category of student is shown in Table 22.

Table 22

Mean percentage of categories to emerge from responses of High Ability Students

	High Ability Engaged *n=46*	High Ability Disengaged *n=42*
Actions	43.22%	36.75%
Actor	29.95%	22.47%
Audience	28.65%	18.16%
Artefact	26.24%	11.96%
Affordances	6.55%	5.63%
School Subjects	1.20%	.86%

These data indicate that the two groups showed a similar pattern in their references to each component. For both groups, actions were mentioned most frequently, followed by actor, audience, and artefacts. Affordances were rated as low. These results support the claim that high ability students' implicit theories of creativity prioritise the action dimension of the Five A's framework. Finally, school subjects are not strongly associated with students' implicit theories of creativity[52] since students' responses neglected to mention school (engaged students 1.2% versus disengaged .86%).

5.2.2 Results of ANOVA examining differences between Average Ability, High Ability Engaged, and High Ability Disengaged on *Academic Learning Actions*

The mean factor t-scores for each academic learning action for high ability engaged, disengaged, and average ability students were compared using One-way ANOVA. The mean factor t-scores for each category and the comparisons (F ratio and the level of significance, Scheffé mean difference, I-J) are shown in Table 23.

The two high ability groups achieved a higher score on sequential, crystallised, and complex fluid thinking actions [53] than their average ability peers. The HAE students did not differ from the AA group using the basic fluid thinking actions [54].

[52] Link this in discussion to domains data.

[53] Used to categorise HA group

[54] Used to categorise HA group

Table 23

Ability and Engagement Academic Thinking Actions ANOVA

Academic Thinking Actions	Engagement Category *n* =146						F (2,133)	Scheffé mean difference, I-J		
	HAE *n= 51*		HAD *n= 42*		AA *n= 53*			HAE vs HAD	HAE vs AA	HAD vs AA
	M	*SD*	*M*	*SD*	*M*	*SD*				
Sequential Thinking Actions	59.10	10.78	51.08	12.10	40.39	12.42	33.05**	.80**	.1.8**	1.06**
Crystallised Thinking Actions	53.90	8.44	51.88	11.09	44.76	8.23	14.05**	.20	.90**	.71**
Complex Fluid Thinking Actions[55]	56.07	9.83	52.18	8.31	42.44	5.76	38.88**	.38	1.36**	.97**
Basic Fluid Thinking Actions [56]	50.74	4.58	52.84	5.14	47.04	14.89	4.35*	-.20	.37	.59*

* p< .05 ** p< .01

The two high ability groups differed in their sequential thinking actions. The High Ability Engaged students displayed more developed sequential thinking actions than the High Ability Disengaged (HAD) students and the Average Ability students.

5.2.3 Results of ANOVA examining differences between Average Ability, High Ability Engaged, and High Ability Disengaged on Creative Thinking Actions

The extent to which the creative thinking actions of High Ability Engaged and High Ability Disengaged students differ was examined by analysing the scores from completed creative action assessments. The outcomes of the factor analysis procedures (orthogonal principal components analysis using Varimax rotation) were examined to understand the extent to which the three categories differed. The mean factor scores (t-scores) for each factor for each category of engagement are shown in table 24.

[55] Raven's SPM+ sets C, D, & E

[56] Raven's SPM+ sets A & B

5.2.4 Results of ANOVA examining differences between Average Ability, High Ability Engaged, and High Ability Disengaged students on Actor, Affordance, Audience Questionnaire

The hypothesis investigates the extent to which High Ability Engaged, High Ability Disengaged, and Average Ability students differ in their perception of actor, affordance, and audience resources. The factor analysis scores were analysed using One-way ANOVA to examine the extent to which the three levels of engagement differed in their perception of the Affordances and Audience in their classroom. The mean factor scores (t-scores) for each factor for each category of engagement are shown in Table 25. Comparisons between the three categories for each factor (Scheffé mean difference, I-J) and the level of significance are shown.

HAE students achieved a lower score than the HAD students. HAD students are not behaviourally engaged; they report that when in class they do not listen very carefully, or that they work hard to achieve academically but do not want to learn as much as they can from school. HAE students are engaged with regular classroom learning, displaying behaviours such as listening carefully and working hard; they value formal learning, and care if they get into trouble for not completing tasks at school.

Table 24

Mean creative thinking scores for each high ability engagement category

Creative Thinking Actions	HAE *n=51*		HAD *n=36*		AA *n=49*		F (2,133)	p =	One-way AVOVA, Scheffe mean difference (I-J)		
	M	*SD*	*M*	*SD*	*M*	*SD*			HAE vs HAD	HAE Vs AA	HAD vs AA
F1 –Semi-Imposed Figural Thinking Actions 2	52.30	8.4	50.51	11.8	47.23	9.5	3.384	.037	.17	.50*	.32
F2 – Verbal generative ability	53.00	10.31	48.74	10.90	47.80	8.26	3.924	.022	.42	.51*	.09
F3 - Open Figure Thinking Actions 1	51.10	10.9	51.50	8.9	47.70	9.5			-.04	.34	.38
F4 - Imposed Figural Thinking Actions 3	52.20	9.4	50.02	10.2	47.60	10			.22	.46	.24
F5 – Inferential Thinking Actions BC – general	55.14	12.64	48.24	7.24	45.95	5.43	13.37	.000	.68**	.91**	.22
F6 - Divergent Thinking Actions (fluency on Alternative uses)	52.82	13.28	49.16	7.42	47.47	5.98			.36	.53*	.16
F7 – Inferential Thinking Social Domain	52.03	9.93	51.58	10.88	46.72	8.66	4.33	015	.45	.53*	.48
F8 – Humour and Affectivity in Picture Shape Tasks	51.10	10.97	48.46	8.46	49.98	10.04			.26	.11	-.15
F9 – Inferential Thinking Actions per response on Broken Cup	50.78	9.77	49.92	11.37	49.24	9.29			.08	.15	.06
F10 - Critical/Evaluative Thinking Actions	51.61	8.86	49.66	10.08	48.57	10.97			.19	.30	.10
F11- Conditional Thinking	50.58	9.20	50.52	9.87	49.01	10.98			.00	.15	.15
Total Display of Creative Actions[57]	55.83	7.01	50.23	9.60	43.75	9.30	24.63	.000	.55*	1.2**	.64**

* p< .05 ** p< .01

[57] Factor 1 - PS_ Figural_2 SIMULTANEOUS_IMAGERY, Factor 2 - Verbal_generative_ability, Factor 3 - PS_ Figural_1 SIMULTANEOUS_IMAGERY, Factor 4 - PS_ Figural_3 SIMULTANEOUS_IMAGERY, Factor 5 - BC_total inferential score, Factor 6 - Divergent Thinking Actions via fluency, Factor 7 - PROBLEM_DETECTING_SOCIAL_integrative, Factor 8 - HUMOUR_AND_AFFECTIVITY_FIGURAL, Factor 9 - INFERENTIAL_THINKING_impact per response on broken cup, Factor 10 - Critical/Evaluative Thinking, Factor 11- KNOWLEDGE_CONDITIONAL_THINKING

Table 25

Results of ANOVA for Ability and Engagement Categories

Actor, Affordance, Audience Components	Ability and Engagement Category *n= 146*										
	HAE *n= 51*		HAD *n= 42*		AA *n= 53*		One-way AVOVA, Scheffé mean difference (I-J)				
	M	*SD*	*M*	*SD*	*M*	*SD*	F (2,143)		HAE vs HAD	HAE vs AA	HAD vs AA
F1 - Perception of classroom as a positive creative culture	49.25	9.02	49.38	10.65	51.21	10.44			-.01	-.19	-.18
F2 – Creative Drives and Goals	47.92	8.78	50.69	11.67	51.46	9.51			-.277	-.35	-.07
F3 – Knowledge of how to be creative	49.70	8.80	50.94	10.15	49.54	11.05			-.12	.01	.14
F4 – Behavioural Engagement with The Classroom Culture	47.71	8.94	52.81	10.92	49.98	9.82	3.072	.049	-.50*	-.22	.28
F5 – Impulsive Non- Conformity	52.02	8.31	48.30	10.49	49.41	10.91			.37	.26	-.11
F6 – School Engagement/ Positive Connection	49.26	7.26	52.85	11.97	48.45	10.28			-.35	.08	.44
F7 – Positive Physical Heath	48.48	8.04	52.64	9.08	49.38	11.98			-.41	-.08	.32
F8 – Unusual Perception/Magical Thinking	49.02	9.02	51.17	10.35	50.02	10.68			-.21	-.10	.11
F9 – Creative Self-Efficacy	50.14	6.85	48.81	10.11	50.80	12.30			.13	-.06	-.19
F10 - Time and space in class to be creative	52.63	9.75	48.61	9.22	48.57	10.49			.40	.40	.01
F11 – Opportunities to practise being creative in class	48.54	8.12	50.76	10.99	50.80	10.81			-.22	-.22	.01
F12 – Disconnected from Creative Audience	51.00	9.53	48.91	11.61	49.90	9.12			.20	.11	-.09
F13 – Extrinsic motivation	49.91	9.20	51.32	9.91	49.04	10.85			-.14	.08	.22
F14 - Emotional Sensitivity	52.69	9.15	50.18	8.82	47.26	11.06	4.006	.020	.25	.54*	.29
F15 – Extrinsic-Others (Giving and Guidance)	50.11	10.18	50.02	10.09	49.88	9.95			.01	.02	.01
F16 – Emotional Engagement with Classroom learning	49.23	10.29	52.31	10.52	48.91	9.14			-.30	.03	.34
F17 – Family Economic capital	48.55	9.84	50.96	8.81	50.64	11.01			-.24	-.20	.03
F18 – Perceived mismatch with Classroom Culture	52.61	8.06	47.55	11.65	49.43	9.87	3.168	.045	.50	.31	-.18

5.2.5 Cluster analysis for High Ability Engaged and Disengaged Students

A hierarchical cluster conducted exclusively on the high ability cohort revealed 5 clusters to be most representative of the latent clusters in the data. Selecting 5 clusters preserved diversity but also maintained representative group sizes. Cluster Analysis requires that the sample size be large enough to sufficiently represent small groups found within the population and to represent the underlying structure (Hair, 2014 p.429). After using the hierarchical cluster to explore the quantity of cluster groups, K-means cluster was conducted with 5 groups and an ANOVA was conducted between the groups. The results of the K-means Cluster Analysis including ANOVA is supplied below in table 26. 20 significant differences were found.

Table 26
Cluster Analysis for Ability and Engagement

	Cluster 1	*Cluster 2*	*Cluster 3*	*Cluster 4*	*Cluster 5*	*Total*
Ability and Engagement	*n*=14	*n*=4	*n*= 28	*n*= 30	*n*= 5	*n*= 81
High Ability Engaged	11 (.22)	1 (.02)	14 (.28)	20 (.42)	3 (.06)	49
High Ability Disengaged	3 (.09)	3 (.09)	14 (.44)	10 (.31)	2 (.06)	32
Domain of Ability						
Global	5 (.15)	0	12 (.38)	12 (.38)	3 (.09)	32
Verbal	2 (.13)	0	6 (.39)	6 (.39)	1 (.07)	15
Non-Verbal	7 (.21)	4 (.12)	10 (.29)	12 (.35)	1 (.03)	34
Gender						
Female	8	1	18	14	0	41
Male	6	3	10	16	5	40

Table 27

Final Cluster Centres and ANOVA for High Ability only

	Cluster						
	1	**2**	**3**	**4**	**5**	**F**	**Sig**
Crystallised Thinking Actions	.32	-1.33	.34	.39	.69	3.70	**.008**
Complex Fluid Thinking Actions	.49	.84	.35	.49	.87	.47	.757
Basic fluid Thinking Actions	.08	.74	.14	.11	-.06	1.72	.154
Sequential Thinking Actions	.42	-1.02	.68	1.08	-.08	4.08	**.005**
F10 - Critical/Evaluative Thinking Actions	-.09	-.11	.10	.23	-.28	.51	.726
F1 – Semi-Imposed Figural Thinking Actions 2	.18	-.31	.07	.21	.06	.25	.905
F3 - Open Figure Thinking Actions 1	.74	-1.09	.48	-.22	.11	5.63	**.000**
F4 - Imposed Figural Thinking Actions 3	-.10	.17	.33	.25	-1.14	2.83	**.030**
F2 – Verbal generative ability	.33	-.26	.14	.39	-.94	1.83	.131
F5 – Inferential Thinking Actions BC – general	.24	.25	.00	.17	2.89	10.92	**.000**
F7 – Inferential Thinking Social Domain	-.10	-1.04	.12	.55	-.23	3.65	**.009**
F8 – Humour and Affectivity in Picture Shape Tasks	1.00	-.70	-.31	.07	-.51	6.13	**.000**
F6 - Divergent Thinking Actions (fluency on Alternative uses)	-.36	-.74	-.05	.56	.76	3.13	**.019**
F11- Conditional Thinking Actions	.52	-.46	-.12	-.03	.13	1.59	.186
F9 – Inferential Thinking Actions per response on Broken Cup	-.10	-.27	.56	-.44	.14	4.41	**.003**
Total Display of Creative Actions	.82	-1.21	.36	.42	.21	5.26	**.001**
F1 - Perception of Positive Creative Culture	-.67	.16	.27	.16	-.11	2.62	**.041**
F2 – Creative Drives and Goals	-.24	.20	-.52	.03	.93	3.13	**.019**
F3 – Prior Experiences Facilitate Creative Growth	-.09	-.53	-.03	.06	.80	1.20	.315
F4 – Behavioural engagement with classroom culture	.00	.35	.40	-.38	.41	2.34	**.062**
F5 – Impulsive Non-Conformity	.29	.86	-.08	.08	.62	1.52	.206
F6 – School Engagement/Positive Connection	-.16	.21	.35	-.17	.30	1.63	.175
F7 – Positive Physical Heath	-.46	-.66	.37	-.12	.53	3.82	**.007**
F8 – Unusual Perception/Magical Thinking	-.52	1.32	-.32	.34	.12	4.98	**.001**
F9 – Creative Self-Efficacy	.38	-1.04	-.04	-.01	-.48	3.17	**.018**
F10 - Time and space in class to be creative	.44	.33	-.01	-.07	-.05	.74	.566
F11 – Opportunities to practise being creative in class	.31	.78	-.39	.07	.07	2.59	**.043**
F12 – Disconnected from Creative Audience	-.46	-1.04	.01	.39	-.23	3.15	**.019**
F13 – Extrinsic motivation	-.24	-.57	.31	.10	-.44	1.61	.179
F14 - Emotional Sensitivity	.42	.54	-.27	.39	.58	3.13	**.019**
F15 – Extrinsic-Others (Giving and Guidance)	-.33	.61	.45	-.17	-.78	3.30	**.015**
F16 – Emotional engagement with classroom learning	-.01	.22	.31	-.04	.12	.49	.745
F17 – Family economic capital	-.55	-.22	.12	.08	-1.05	3.24	**.016**
F18 – Perceived mismatch with classroom culture	-.20	.10	.15	.00	.52	.65	.628

Table 28

Categorical Representation of Significant High Ability Cluster Characteristics

	Cluster				
Dimensions	**1**	**2**	**3**	**4**	**5**
Academic Actions					
Complex Fluid Thinking Actions*	**H**	**H**	**H**	**H**	**H**
Basic Fluid Thinking Actions*	**M**	**H**	**M**	**M**	**H**
Crystallised Thinking Actions	**H**	**VL**	**H**	**H**	**H**
Sequential Thinking Actions	**H**	**VL**	**H**	**VH**	**M**
Creative Actions					
Open Figure Thinking Actions 1	**H**	**VL**	**H**	**L**	**M**
Imposed Figural Thinking Actions 3	**M**	**M**	**H**	**M**	**VL**
Inferential Thinking Actions BC – general	**H**	**H**	**L**	**L**	**VH**
Inferential Thinking Social Domain	**L**	**VL**	**M**	**H**	**L**
Humour and Affectivity in Picture Shape Tasks	**VH**	**L**	**L**	**M**	**L**
Divergent Thinking Actions (fluency on Alternative uses)	**L**	**L**	**M**	**H**	**H**
Inferential Thinking Quality per response on Broken Cup	**M**	**L**	**H**	**L**	**M**
Verbal Generative Ability*	**H**	**L**	**M**	**H**	**L**
Total Display of Creative Actions	**H**	**VL**	**H**	**H**	**M**
Actor					
Unusual Perception/Magical Thinking	**H**	**VL**	**H**	**L**	**M**
Creative Self-Efficacy	**L**	**VH**	**M**	**M**	**H**
Emotional Sensitivity	**L**	**L**	**H**	**L**	**L**
Positive Physical Heath	**H**	**H**	**L**	**M**	**L**
Behavioural Engagement with The Classroom Culture	**M**	**L**	**L**	**H**	**L**
Audiences					
Perceives Positive Creative Culture	**H**	**L**	**L**	**L**	**M**
Extrinsic-Others (Giving and Guidance)	**H**	**L**	**L**	**M**	**H**
Disconnected from Creative Audience	**H**	**VH**	**L**	**L**	**M**
Affordances					
Opportunities to practise being creative in class	**H**	**L**	**H**	**M**	**M**
Family Economic capital	**H**	**M**	**L**	**L**	**VH**

*non-significant dimensions included in the learning profile

Description of High Ability Cluster 1

- Distribution of High Ability Classroom Engaged (*n*= 11) and High Ability Classroom Disengaged (*n*= 3).

- Spread of Domain of Ability is Global (*n*=5), Verbal (*n*=2), and Non-Verbal (*n*=7).
- Highest on total Creative Thinking Actions: strengths in conveying humour and emotion, open figural tasks, general inferential thinking, and generating verbal responses to social problem-solving.
- High level Complex Fluid Thinking, Crystallised Thinking Actions, Sequential Thinking Actions.
- Weaker on Basic Fluid Reasoning when compared with clusters 2 and 5.
- Weaker at social inferential thinking, that is, they wrote lengthy responses on the social problem task but not to a high quality.
- High levels of unusual perception and positive health.
- Low in self-efficacy and not sensitive to emotions of others.
- Perceive a positive culture for creative thinking and are connected with peers.
- Do not care about what their teacher thinks about their creativity.
- They see many opportunities to work collaboratively and practise their creativity
- Believe not enough time and space to be creative in class.
- High levels of economic capital.

Description of High Ability Cluster 2

- Distribution of High Ability Classroom Engaged (*n*= 1) and High Ability Classroom Disengaged (*n*= 3).
- Spread of Domain of Ability is Global (*n*=0), Verbal (*n*=0), and Non-Verbal (*n*=4).
- High Basic Fluid and Complex Fluid Thinking Actions.
- Crystallised Thinking and Sequential Thinking Actions were lowest compared to the other four clusters.

- Very low total display of Creative Actions.
- High level on the broken cup task (general inferential thinking), but their responses lack detail and quality.
- Moderate levels of economic capital.
- Low levels of unusual perception, perception of positive classroom culture, emotional sensitivity, behavioural engagement, and motivation to help others.
- Perceive lack of time, space, and opportunities to work collaboratively with their peers and practise their creativity.
- Disconnected from their classroom culture.
- Disaffected and do not care about their teacher's opinion (Audience).
- High levels of creative self-efficacy.

Description of High Ability Cluster 3

- Distribution of High Ability Classroom Engaged (*n*= 14) and High Ability Classroom Disengaged (*n*= 14).
- Spread of Domain of Ability is Global (*n*=12), Verbal (*n*=6), and Non-Verbal (*n*=10).
- Moderate to High Complex Fluid Thinking Actions, Crystallised Thinking, and Sequential Thinking Actions.
- High level on Total Creative Actions with mostly medium to high scores across the different creative thinking actions.
- High levels of unusual perception, emotional sensitivity.
- Perceive affordances of time and space to practise their creativity. High level of opportunity.

- Low family economic capital, positive creative culture, disconnection from creative audience, and motivation to help others.
- Moderate level of creative self-efficacy.

Description of High Ability Cluster 4

- Distribution of High Ability Classroom Engaged (*n*= 20) and High Ability Classroom Disengaged (*n*= 10).
- Spread of Domain of Ability is Global (*n*=12), Verbal (*n*=6), and Non-Verbal (*n*=12).
- Highest on Sequential Thinking Actions.
- Generally strong in terms of being able to perform academic and verbal creative thinking actions.
- High verbal capacity and inferential quality in the social domain.
- High behavioural engagement with their classroom.
- Moderate on both extrinsic measures.
- Moderate levels of creative self-efficacy and affordances in their classroom in the form of time, space, and opportunities to work collaboratively with their peers and use their creativity.
- Low economic capital at their disposal.
- Low emotional sensitivity and unusual perceptions[58]

Description of High Ability Cluster 5[59]

- Distribution of High Ability Classroom Engaged (*n*= 3) and High Ability Classroom Disengaged (*n*= 2).

[58] This suggests that their thinking is clear and stable with self-regulatory processes - Sequential thinking Actions requires these attributes as does Complex Fluid Thinking Actions.
[59] Only male students.

- Highest on Fluid and Crystallised Thinking Measures.
- Moderate Sequential Thinking Actions, Total Display of Creative thinking actions.
- Very high level of general inferential and divergent thinking.
- High level of creative self-efficacy and motivation to create for social gain.
- Low level figural drawing and social problem-solving tasks.
- Low Behavioural Engagement with the classroom culture.
- Moderate care about their teacher's opinion of their creative artefacts and emotional sensitivity.
- Moderate perception of positive classroom culture, time and space to be creative in class, and opportunities to work collaboratively for creative purposes.
- Very high economic capital.
- High level of importance of using their creativity to help others.
- Low unusual perceptions.

5.2.6 High Ability Students and School Improvement

As hypothesis 2 investigates the learning profiles of High Ability Engaged and High Ability disengaged students, part of this profile relates to their knowledge of school as a place for them to be creative and to develop their creative ability. To understand participants' views of their respective schools, they were asked to respond to the following prompts:

- 'How can school become a place for you to be more creative?'
- 'How would you like school to be different?'

Each student's response was coded in line with the Five A's framework (Glăveanu, 2013), and descriptive analysis was conducted using NVivo. See table 29 for instances mentioned in student responses.

Table 29

High Ability Students' Mention of Five A components

	Codes					
	Actions	Actor	Affordances	Artefacts	Audience	Total per group
HA CD	27	23	41	14	35	140
HA CE	46	30	61	34	46	217
Total per Code	74	53	102	48	80	357

These data indicate that the groups showed different patterns in their reference to each component of the Five A's framework. For both groups, Affordances were mentioned most frequently, followed by Audience, Actions, Actors, and Artefacts. Key themes from these two groups concerning how schools can change to enable students to display their creativity provide a clear picture of students' beliefs about their educational context. These themes are listed below in Table 30

5.3. Results for Hypothesis 3

Hypothesis 3: Some combinations of cognitive and Actor, Affordance, and Audience factors are more likely to lead to higher displays of creativity.

In order to understand which combinations of actor, affordance, and audience factors are more likely to lead to higher displays of creativity, regression analysis was performed to predict which thinking actions, affordance, and audience factors are more likely to lead to the production of creative artefacts. See table 31 for an overview of the tasks:

Table 30

Summary of themes mentioned by High Ability Students

	High Ability Disengaged	High Ability Engaged
Actions	**Similarities**	
	• Exploration - Try new things • Hands-on learning • Recognise difference and diversity (respect)	• Exploration - Less repetition of teaching • Hands-on learning • Recognise difference and diversity
	Differences	
	• Be open minded • Focus on learning, not results	• Active learning and problem-solving • Ask good questions (teachers) • Design things • Choice (pathways, tasks, subjects) • Social interaction (class discussions & collaboration)
Actor	**Similarities**	
	• Have more say and freedom • Self-expression • Connect with students	• Have more say and freedom • Allow self-expression • Connect with students
	Differences	
	• Increase skills of individual • Be involved • Be enjoyable • Included and accepted	• Interests of students (topics) • Self-driven, active, and Independent • Risk taking and exploratory • Less pressure to succeed
Affordances	**Similarities**	
	• Hands-on learning (facilities) • More choice in subjects • More opportunities to be creative	• Hands-on learning (facilities) • More choice/better subjects (creativity subject) • More opportunities to be creative
	Differences	
	• Up-to-date technology • Better assessments (Curriculum) • More space to design artefacts • More music (Curriculum)	• Less digital technology in classes (distracting) • More excursions/fewer textbooks • More artistic programs (curriculum) • Open classroom structure - options and possibilities
Artefacts	**Similarities**	
	• More choice when creating artefacts	• More choice when creating artefacts
	Differences	
	• Design and make physical things – wood tech, plumbing, drawing, painting: not just writing • Change in personal knowledge	• Share artefacts with others • Exposure to other creative artefacts: galleries, etc.
Audience	**Similarities**	
	• Encourage individuality • Understand and connect with student (as a person) – be friendly • Encourage diversity: people, opinions, and ideas • Encourage, support, and accept new ideas	• Encourage individuality and independence • Understand and connect with student (as a person) – be less demeaning and aggressive/be approachable • Encourage diversity: people, ideas, and appearance • Encourage, support, and accept new ideas (all subjects)
	Differences	
	• Be less traditional and less mainstream • Integrity – teachers do what they say they will • Trust students	• Focus on improving programs • Share and collaborate

Table 31

Results of Linear Regression

	Variables							
Task	Sequential Thinking Actions	Crystallised Thinking Actions	Complex Fluid Thinking Actions	Impulsive Non-conformity	Unusual Perception/ Magical Thinking	Creative Drives and Goals	Extrinsic motivation - Self – (Gain)	Time and space in class to be creative
Total creating thinking action score	.000	.003	.004	.002	.016[$]	.016[$]	.024	
Broken Cup	.007	.001	.000	.002				.017
Social problem-solving task	.000	.004		.016		.002[$]		.017
Figural drawing	.000				.009[$]	.007[$]		
Divergent Thinking Actions (fluency on Alternative uses)	.001							

[$] B is negative for these factors

5.3.1 Total Creative Actions

To investigate the hypothesis that some combinations of cognitive and actor, affordance, and audience factors are more likely to lead to higher displays of creativity, linear regression was employed to analyse which combinations of academic actions and actor attributes, affordances, and perceptions of audience were more likely to lead to displays of creative thinking actions. The results of the regression indicated seven predictors explained 47.6% of the variance (R2 =.476, F (1, 128) =5.21, p = .024. It was found that displays of creativity are significantly predicted by Sequential Thinking Actions (B =.251, p.000), Crystallised Thinking Actions (B =.206, p.003), Complex Fluid Thinking Actions (B =.200, p.004), Impulsive Non-Conformity (B =.212, p.002), Extrinsic Motivation (B =.148, p.024), Creative Drives and Goals (B = -.159, p.016), and Unusual Perception/Magical Thinking (B = -.155, p. 016). See table 32 for B and significance level of T-test for Total Score.

Table 32

B and significance level of T-test for Total Score (in model 7)

Factor/Predictor	B	sig.
Sequential Thinking Actions	.251	.000
Impulsive Non-Conformity	.212	.002
Crystallised Thinking Actions	.206	.003
Complex Fluid Thinking Actions	.200	.004
Creative Drives and Goals	-.159	.016
Unusual Perception/Magical Thinking	-.155	.016
Extrinsic Motivation - Self – (Gain)	.148	.024

5.3.2 Social Problem-solving Task

To investigate the hypothesis that some combinations of cognitive and actor, affordance, and audience factors are more likely to lead to higher displays of creativity, linear regression was used to analyse which combinations of academic actions and actor

attributes, affordances, and perceptions of audience were more likely to lead to displays of creative actions. The results of the regression indicated 5 predictors explained 37.6% of the variance (R2 =.376, F (1, 131) =5.81, p = .017. It was found that displays of creative thinking on the Social Problem-Solving Task were significantly predicted by Sequential Thinking Actions (B =.255, p.000), Crystallised Thinking Actions (B =.206, p.004), Impulsive Non-Conformity (B =.174, p.016), Extrinsic Motivation (B =.168, p.017), and Creative Drives and Goals (B = -.217, p.002). See table 33 for B and significance level of T-test for Social Problem-solving Task.

Table 33

B and significance level of T-test for Social Problem-solving Task

Factor/Predictor	B	sig.
Sequential Thinking Actions	.255	.000
Crystallised Thinking Actions	.210	.004
Creative Drives and Goals	-.217	.002
Impulsive Non-Conformity	.174	.016
Extrinsic motivation - Self – (Gain)	.168	.017

5.3.3 *Figural Drawing*

To investigate the hypothesis that some combinations of cognitive and actor, affordance, and audience factors are more likely to lead to higher displays of creativity, linear regression was used to analyse which combinations of academic actions and actor attributes, affordances, and perceptions of audience were more likely to lead to displays of creative action. The results of the regression indicated seven predictors explained 31.8% of the variance (R2 =.318, F (1, 135) =7.03, p = .009. It was found that displays of creative thinking on the figural drawing task are significantly predicted by Sequential Thinking Actions (B =.329, p.000), Creative Drives and Goals (B = -.194, p.007), and Unusual Perception/Magical Thinking (B = - 185., p.009) See table 34 for B and significance level of T-test for Figural Drawing tasks.

Table 34

B and significance level of T-test for Figural Drawing

Factor/Predictor	B	sig.
Sequential Thinking Actions	.329	.000
Creative Drives and Goals	-.194	.007
Unusual Perception/Magical Thinking	-.185	.009

The results suggest that the outcomes of the figural drawing task may be predicted by identifying aspects of thinking such as the ability to think sequentially in both verbal and non-verbal domains, but also by students' creative drives and goals, as well as their level of Unusual Perception/Magical Thinking.

5.3.4 Broken Cup Task

To investigate the hypothesis that some combinations of cognitive and actor, affordance, and audience factors are more likely to lead to higher displays of creativity, linear regression was used to analyse which combinations of academic actions and actor attributes, affordances, and perceptions of audience more likely to lead to displays of creative action. The results of the regression indicated seven predictors explained 37.9% of the variance (R2 =.379, F (1, 140) = 5.88, p = .017. It was found that displays of creative thinking on the Broken Cup Task are significantly predicted by Complex Fluid Thinking Actions (B =.327, p.000), Crystallised Thinking Actions (B = .240, p.001), Impulsive Non-Conformity (B = .208, p.009), Sequential Thinking Actions (B = .143, p.007), and Time and space in class to be creative, (B = .163, p.017), See table 35 for B and significance level of T-test for Broken Cup Task.

Table 35
B and significance level of T-test for Broken Cup Task

Factor/Predictor	B	sig.
Complex Fluid Thinking Actions	.327	.000
Crystallised Thinking Actions	.240	.001
Impulsive Non-Conformity	.208	.002
Sequential Thinking Actions	.143	.007
Time and space in class to be creative	.163	.017

5.3.5 Divergent Thinking Task

To investigate the hypothesis that some combinations of cognitive and actor, affordance, and audience factors are more likely to lead to higher displays of creativity, linear regression was used to analyse which combinations of academic actions and actor attributes, affordances, and perceptions of audience were more likely to lead to fluency on the alternative uses task. The results of the regression indicated that 1 predictor explained 31.8% of the variance (R2 =.081, F (1, 123) =10.9, p = .001. It found that divergent production, fluency on Alternative uses, is significantly predicted by Sequential Thinking Actions (B =.201, p.001). See table 36 for B and significance level of T-test for Broken Cup Task.

Table 36
B and significance level of T-test for Divergent Thinking Actions

Factor/Predictor	B	sig.
Sequential Thinking Actions	.201	.000

The data has been presented and organised according to the hypothesis. Based on the results above, many significant results have emerged for all three hypotheses. The next chapter discusses these results with reference to the literature discussed in chapter 2.

Chapter 6

Discussion

In the previous chapter, results of the data collection were reported. In this chapter, results are interpreted to test the hypotheses outlined in chapter two. The learning profiles of engaged and disengaged as well as high ability students will be unpacked. Aspects of these profiles will be discussed to elucidate how interactions and relations are critical to the development of a student's creative ability. This chapter will then discuss results relating to displays of creative actions. All differences below were statistically significant unless otherwise stated.

6.1 Hypothesis 1: Classroom Engaged students (CE) differ from Classroom Disengaged students (CD) and School Disengaged students (SD) in the following ways: specific Thinking Actions (Learning and Creative Actions) and their perceptions of Actor, Audience, and Affordances

To investigate hypothesis 1, evidence was collected relating to the learning profiles of engaged and disengaged students. It was hypothesised that differences between engaged and disengaged students' learning profiles affect their participation in, and engagement with, classroom learning.

6.1.1 Comparing Academic Thinking Actions between Engagement Groups

Actions are how humans transact and interact with the environment. Glăveanu (2013) describes action as goal directed, structured, symbolic, and meaningful while being both psychological and material. A basic level of competency in action patterns associated with a classroom culture is required for engaging at school but for developing creative ability.

Several differences were found between the students' learning profiles with regard to Academic Thinking Actions. These differences related to the student's ability to perform Sequential Thinking Actions, Crystallised Thinking Actions, and Complex Fluid Thinking Actions. As predicted, Classroom Engaged (CE) students showed higher degrees of competence than the Classroom Disengaged and School Disengaged students on tasks measuring Sequential Thinking Actions ($p<.01$). The Classroom Engaged students were able to retain and recall a significantly higher number of items than both the disengaged groups. This an important finding because it signifies a correlation between engaged students' learning profiles and classrooms that depend on linear and sequential teaching and learning, as measured by the Sequential Thinking Actions, Crystallised Thinking Actions, and Complex Fluid Thinking Actions tasks.

Sequential thinking actions are required to decode text and follow instructions (Das, 2002; Mohanty, 1994, Hammill 1998). Classrooms that privilege verbal, oral, or written transmissions of information may be less effective at instilling culturally-valued ideas in some students (Munro, 2006b). When this occurs, students who are unable to access this information are more likely to become disengaged. This means that students with low sequential/successive processing are less likely to follow or understand verbal instructions in class and less likely to internalise ways of thinking fostered in the classroom (Munro, 2011a). These students may miss opportunities to engage in productive social interactions (Albert & Colangelo, 1994; VanTassel-Baska et al., 2009). This is more likely for students who are unable to process verbal information sequentially.

Furthermore, Classroom Disengaged and School Disengaged students are more likely to struggle with grammatically fluent language output than Classroom Engaged students. These findings reinforce previous research from Goetz et al. (2013) investigating students'

emotions in the classroom which found that a teacher's supportive presentation style (understandability, use of illustration, enthusiasm, and fostering attention) was likely to lead to positive academic emotions. It follows that students are more likely to become disengaged in classrooms that only offer access to cultural information verbally. Classrooms that overemphasise text-based artefacts and related thinking actions, without providing students with support, exclude students with low sequential thinking ability.

Further differences in the learning profile were found in relation to the Classroom Engaged students' crystallised thinking ability. Specifically, CE students outperformed the SD group on measures of Crystallised Thinking Actions ($p < .05$). The results suggest that the vocabulary of CE students is a significant characteristic of engaged students. These differences in learning profile build on previous research from Lassus-Sangosse et al., (2008) who showed that sequential and simultaneous (crystallised thinking/vocabulary) thinking actions are both related to reading performance, while 'simultaneous processing alone significantly contributed to reading speed and accuracy' (p.979). It follows that higher competency in processing information simultaneously means CE students are better able to access their semantic networks in response to the demands of the teaching (McRae & Jones, 2013). This shows the compatibility between the Classroom Engaged students learning characteristics and their classroom cultures.

The School Disengaged group were weakest at crystallised thinking/simultaneous processing. This finding is consistent with previous research showing that students who struggle at school are highly likely to have issues with successive or simultaneous processing (Das, 1992/2002; Das & Georgiou, 2015; Hammill, 1998; Mohanty, 1994). In terms of classroom learning, difficulties arise when these students are unable to follow instructions, take dictation, comprehend texts, and write grammatically correct sentences, since these

involve sequential and simultaneous processing. The significance of these differences rests on the expectation that students with lower Sequential Thinking actions in their learning profiles face difficulties in classrooms that rely heavily upon verbal learning (Munro, 2006a).

The finding that both disengaged groups scored lower on Crystallised Thinking actions reinforces the notion that vocabulary tests identify the extent to which a student has internalised academic cultural knowledge. Of relevance here is that the SD group reported that their families did not have the economic capital to support their creative pursuits. While the current study did not explicitly measure the SES of the participants, these results give some strength to the proposition that Crystallised Thinking in the form of vocabulary is a strong indicator of enculturation in formal *academic* culture where middle class values tend to dominate the classroom culture (Boon & Lewthwaite, 2016). These results echo previous research showing that children from disadvantaged communities are more likely to score lower on items that require crystallised intelligence, cognitive-level problem-solving, and simultaneous processing of information (Mlambo, 2017).

Further examination of the learning profiles shows an important difference between the 3 engagement groups. Specifically, the CE group scored significantly higher than the CD ($p < .05$) and SD ($p < .01$) groups on Complex Fluid Thinking Actions. As stated in chapter two, fluid thinking is a strong indicator of change in crystallised action abilities over time (McArdle, 2001). Further, fluid thinking is heavily implicated in changes in quantitative ability, academic knowledge, and reading (Ferrer et al., 2007). The engaged group performed to the highest level at advanced observation, pattern recognition, and clear thinking further supporting previous research that showed a 'close relationship between working memory and measures of fluid intelligence and science achievement' (Yuan et al., 2006, p.83).

As explained in the methods chapter, Fluid Thinking actions were assessed using Raven's SPM+. This assessment was selected because it is culturally fair (Raven, 2009). The test is divided into five sections: Sections A and B each contain 12 2x2 matrices, sections C, D, and E each contain 12 3x3 matrices. Each section becomes progressively more difficult, requiring more abstract reasoning. In this study, the categories did not show significant differences in their Basic Fluid Thinking Actions. Interestingly, the CD group scored higher than both other groups on Basic Fluid Thinking. While it seems unexpected for the CD group to score higher, previous research investigating disadvantaged students found fluid intelligence and non-verbal ability to be a prominent strength (Seeley, 2004; Seeley, 1984; VanTassel-Baska et al., 2007). That said, the CD group were unable to perform to such a high level as they progressed through the more difficult sections of the SPM+. The differences may arise from the disengaged students losing interest in the tasks due to their cognitive overload, distractibility, or lack of mental stamina.

6.1.2 Comparing Creative Thinking Actions Between Engagement Groups

Similarities and differences were found between the three engagement groups in relation to Creative Thinking actions. More specifically, divergent thinking fluency on the alternative uses tasks was similar across the three groups, as were critical thinking actions on the social problem-solving task. This shows the divergent thinking actions and critical thinking actions are found in students regardless of whether they are engaged at school or not. This is an important finding because it implies that all students can perform actions which lead to creative artefacts. Development of their creative ability should thus focus on creating the conditions for these students to share their thinking in their classroom while building on what they can already do.

On the other hand, significant differences were found in 4 areas: Verbal generative ability, Imposed Figural Thinking Actions, Inferential Thinking Actions, and Total Display of Creative Actions. The first of these differences was found on the social problem-solving task. Specifically, the verbal generative ability of the Classroom Engaged (CE) group, reflected in total words written on the task, was significantly greater than that of the School Disengaged (SD) group ($p < .01$). Further, the Classroom Disengaged (CD) group performed at a higher level when compared to the School Disengaged (SD) group ($p < .05$). These results suggest that engaged students are more likely to submit responses containing a higher number of words; however, more words did not equate to quality since all three groups performed to a similar level on social inferential thinking measures. The difference mostly appears due to CE and CD students writing complete sentences and generating more responses than the SD groups. This finding is consistent with the current view which holds that disengaged students are more likely to have language delays or disorders with language use rather than be cognitively inferior (Locke et al., 2002; Nelson et al., 2011; Roy et al., 2014). The students' quality of thinking was not determined by their category of engagement.

The second difference relates to the Imposed Figural task, that is, the ability to generate figural drawing on the constrained drawing task. A significant difference was found between the CE and SD groups ($p < .05$). The CE group used the third stimuli to a higher level insofar as they were better at using the space, making connections, including elements of fantasy, demonstrating richness, and adding new elements. This finding highlights the possibility that engaged students were more able to create a drawing in response the affordances on the page. This could be a result of the CE groups' capacity to understand the instructions of the task. This seems to partially confirm the conjecture that when affordances of an artefact/task are presented in *text* form it becomes a 'literacy event' and requires an

understanding of the particular ways of thinking in cultural contexts (Street & Martin-Jones, 2000).

The third difference related to general Inferential Thinking actions on the *Broken Cup* task. This task differed in relation to the problem-solving task in that the latter requires domain-specific knowledge. The *Broken Cup* task requires general knowledge to be utilised as it does not constrain the student to any specific domain of knowledge. The CE group scored significantly higher than both other groups on general Inferential Thinking actions ($p < .05$). The CE group showed a greater ability to think inferentially while providing not only a higher quantity of responses but also more elaborated responses.

Responses from the Classroom Engaged group also included a higher number of actions. These differences may once again come down to differences in language ability, not cognition. Sembiante et al., (2018) showed that students with a developed inferential thinking capacity are 'better able to make connections and understand the meaning of a book when engaging in reading' (p.15). The engaged students were able to exploit available affordances perceived in the task stimulus to build models of the world and generate possibilities. But most importantly, the CE were able to express their thinking in words on a page in a culturally appropriate way.

In summarising the differences in creative thinking actions, it helps to look at the final difference between the engagement groups. Interestingly, each of the groups differed significantly from each other on total scores for the creative thinking assessment. Specifically, the Classroom Engaged differed from the Classroom Disengaged ($p < .05$) and School Disengaged ($p < .01$). Further, the Classroom Disengaged differed from the School Disengaged group ($p < .05$). While this finding was unexpected, the linear regression reported in the previous chapter explains the differences here; that is, the predictors of total scores on the

creative thinking tasks were Sequential Thinking Actions (.000), lower Impulsive Non-conformity (.002), Crystallised Thinking Actions (.003), and Complex Fluid Thinking Actions (.004), all of which were strengths of the engaged group. While Creative Drives and Goals (.016), Unusual Perception/Magical Thinking (.016), and low Extrinsic Motivation (.024) were also implicated in the total score, these were not found to be attributes of engaged students. Consequently, the engaged groups' ability to use language meant they were able to exploit the affordances of the task to a greater level than the disengaged groups on these tasks. Given the above discussion relating to the importance of language use in regular classrooms, it is likely that these differences explain some differences in the level of engagement with classroom learning.

6.1.3 Comparing Actor Attributes between Engagement Groups

Glăveanu (2015) asserts that understanding the creativity complex requires a 're-centring' of the person in a network of relations. This means that the 'actor is a person embedded in the field of social relations specific for any human community and society' (p.72). This 're-centring' involves examining aspects of the actor in order to understand how they might fit into their ecology.

Two significant differences emerged between the engaged and disengaged groups regardless of ability: Behavioural Engagement and Impulsive Non-conformity. While this seems to be a trivial claim, the Classroom Engaged reported being significantly more engaged in class than the Classroom Disengaged ($p < .05$). The Classroom Engaged students felt school was well suited to them. The results reinforce the initial categories of engagement used for the ANOVA, as well as describing what engagement looks like for the CE group; that is, the CE group listen carefully in class, try to do their best, and care about school and academic achievement. They want to learn as much as they can and are able to manage their learning.

This is was expected as Slade (2001) found that disengaged students have lost faith in school with many believing schools expect adult behaviour yet rarely provide authentic opportunities for social-emotional development. While the School Disengaged group was relatively similar to the CD group, the SD reported being more engaged. The SD group were an interesting cohort because, while they were disengaged from mainstream, they could be engaged or disengaged in alternative settings.

The second significant difference relates to Impulsive Non-Conformity. Again, this difference only relates to the Classroom Engaged and Classroom Disengaged ($p < .05$) cohorts. Specifically, the CD group reported having the urge to break or smash things, and also to hit someone. Further, CD students report being easily distracted from work by daydreams, often feeling like doing something shocking or controversial. Again, the SD group is similar to the CD group in so far as both the disengaged groups reported being impulsive, though not significantly.

According to Mason and Claridge (2006), impulsive thinking and behaviours typify antisocial and eccentric behaviour in Schizotypy. These attributes may not necessarily be negative ones, considering Dickman's (1993) argument that impulsivity can be beneficial on some cognitive tasks; students may be more able to switch attention from one source of information to another. Following on from this, Tsakanikos and Reed (2003) suggest that impulsivity is unrelated to intelligence, having both functional and dysfunctional facets (p.6). As shown above, lower impulsivity and higher unusual perceptual thinking were heavily implicated in total scores on the creative tasks. This is consistent with research showing that highly creative participants exhibited similar patterns of brain activation during creative thinking (Batey & Furnham, 2008). Batey and Furnham (2008) also showed that unusual experiences and impulsive non-conformity were significantly related to self-ratings of

creativity, creative personality, and everyday creative achievement. Whether this is viewed as positive or negative rests on the audience's evaluation.

Being impulsive may lead to CD students thinking differently from their peers. Reinforcing the antisocial identity of the CD student is the fact that these students occupy a space within the mainstream schools outside of a regular classroom. They are characterised by their school as not fitting in. Conversely, being in program with like-minded peers can build connection to those peers and may lead to involvement in community projects. The challenge is to have CD students connect with their school and teachers because low school connectedness and high peer connectedness is associated with higher risks of substance abuse or mental health problems (Bond et al., 2007).

6.1.4 Comparing Perception of Affordances between Engagement Groups

The possession of appropriate thinking actions will lead to greater achievement in that classroom if a student is able to identify and exploit the affordances offered in their classroom. Gibson (1986) defines affordances of the environment as what they offer to the individual, what they provide or furnish. Extending this, Glăveanu (2013) states that 'to discover and fully exploit existing environmental potentials, an actor needs to possess certain knowledge and set of abilities' (p.76). This implies that students who act in culturally appropriate ways do so because their perception of the affordances in their classroom align with their teacher's perception of the same affordances. Consequently, these students are more likely to fit their school's ecology making them more likely to flourish within that environment.

Three differences were significantly related to the students' perception of affordances: Economic Capital, time and space in class to be creative, and Perceived mismatch with Classroom Culture. This first of these is economic capital. The Classroom Disengaged

group differed significantly from the School Disengaged group ($p < .05$). The CD group was comparatively similar to the CE group, reporting that their family had the means to support their creative pursuits so that they could excel. The SD group was the least economically supported by family in terms of material resources for being creative.

A second difference emerged between the Classroom Engaged and School Disengaged groups in relation to the time and space to be creative in class ($p < .05$). The SD group reported being afforded time and space in class to be creative. They reported having the freedom to decide how tasks were done and having enough time to be creative in class. The SD groups also believed their creative ability was being used to its full potential given the focus on art and design in their schools. This supports current understandings about best practice for working with disengaged students relates to the findings discussed in section 6.1.3. Specifically, Lamb and Rice (2008) found that effective programs make space for a diversity of students to express their knowledge creatively while also offering support through this process. Lamb and Rice argue that allowing students to be creative in class helps to 'address individual student needs' (p.8). Offering CD students a diverse range of material and symbolic affordances in terms of will increase the likelihood of engagement.

The final difference describes a perceived mismatch with classroom culture. This mismatch was perceived by the Classroom Disengaged group, with a significant difference emerging between the CD and CE groups ($p < .05$). The CD students felt that they did not fit into their classroom ecology. Participation in class is crucial in school, but, for a student to participate, the affordances offered by the teacher should match the student's learning profile. The CD group believed the tests in their classes failed to measure their ability, further reporting that they resisted doing work in class and just behaved as though they were working. These findings are consistent with earlier findings of Morris (2000) who showed that

students engage with tasks when they perceive the curriculum to be relevant. Further, Schussler (2009) argued that disengaged students will be intellectually engaged with classroom learning if they perceive opportunities for success, if there are flexible avenues through which learning can occur, and if they perceive that teachers believe them capable of learning (p.114).

6.1.5 Comparing Perceptions of Audiences between Engagement Groups

Glăveanu (2013) describes the audience as representing 'multiple others assisting, contributing, judging, criticizing, or using the creative act and/or resulting artefact(s)' (p.74). As shown in chapter 2, feeling unsupported by teachers can have a detrimental effect on students' wellbeing and creativity (Anderson et al., 2004; Klem & Connell, 2004; Muller, 2001; Morrison & Allen, 2007; Roorda et al., 2011; Roorda et al., 2017). On the other hand, warm and supportive teachers can positively influence effort and perseverance in secondary school students (Lee, 2012). Teachers thus play a central role in defining the culture of their classroom.

Two significant differences emerged between the three engagement groups in relation to perception of classroom as a positive creative culture, and School Engagement/Positive Connection. The School Disengaged group showed significant differences when compared to the Classroom Engaged and Classroom Disengaged groups ($p < .01$). The SD group expressed a strong belief that their teachers helped to further their creativity. They described their teachers as valuing creativity but also knowing how to help students develop their creativity through their words and actions. Further, the SD group believed that the classroom and school culture were accepting, and that they encouraged creativity with rules that helped foster an inclusive environment. This is consistent with previous research from Lamb and Rice (2008) who argued for a focus on 'creative arts-based

programs for at-risk students' (p.8). The CE group were more mixed in their responses, bringing the group closer to neutral. On the other end of the spectrum, the CD group showed a strong tendency to believe that school thwarted their creativity. These findings are consistent with Shernoff et al.'s (2016) research suggesting that 'teachers' potency to engage students lies in their ability to create, shape, and influence the whole learning environment' (p.54). Importantly, Richardson and Mishra's (2018) research showed that 'creativity can thrive when there is a climate of community, care, and cooperation that emphasizes positive student and teacher relationships' (p.51). Engaging learning environments are challenging and supportive.

Another important finding relates to the student's connection to school. Here, the Classroom Disengaged students significantly differed from the Classroom Engaged and School Disengaged cohorts ($p < .01$). The CE and SD groups both felt that school was one of their favourite places to be. They felt happy to be part of their school, finding it fun and exciting. The result was a positive feeling about being at school. This reinforces Lamb and Rice's (2008) finding that effective interventions to re-engage students require the fostering of connectedness and trust, the availability of immediate and tangible benefits, and acceptance of student diversity (p.24). The CD groups showed a strong tendency to disagree with statements describing school positively, demonstrating what might be called a negative connection with their audience. Based on the CD students' actions and artefacts, they are positioned as outsiders i.e. they are excluded from some regular classes and placed in a separate program to engage them with their school. This finding confirms previous research from Dishion et al., (1999) which showed 'streaming'-style interventions can lead to implicit messages suggesting that 'there is something wrong with you', and also to higher risk behaviours becoming the norm and being rewarded by peer responses.

Wang et al. (2015) showed declines in achievement may not be associated with declines in emotional engagement; however, emotional engagement is closely associated with high levels of academic achievement. Wang et al. (2015), in seeking to describe the variation, argued that a 'combination of educational, structural, and developmental factors could contribute to students' ability to maintain high levels of behavioural and cognitive engagement in the context of feeling disengaged with school' (p.62). Part of the issue may rest on the de-contextualised curriculum that focuses on the reproduction of knowledge, as opposed to the creation of knowledge (Fredricks, 2014). These findings point to the conclusions of Fredricks (2014) that some students find it harder to engage in teacher-led classrooms where students are expected to be passive actors that follow the direction of the audience. Slade (2001) reported similar findings clearly showing that disengaged students found schoolwork boring, repetitive, and irrelevant.

6.1.6 Comparing Artefacts and Engagement Groups

Glăveanu (2013) refers to products as artefacts to draw 'attention to their 'cultured' nature and the cumulative character of creation in human groups and societies. Indeed, unlike products, artefacts can never standalone' (p.74). This makes the produced object cultural.

Engaged students reported a preference for producing artefacts in academic domains such as Natural Sciences (63%), Maths (61.7%), Language and Writing (58%). That said, they also cite Music (62.5%) often. On the other hand, disengaged students were more likely to name domains found outside academic school programs. 88% of the disengaged students named the following pursuits: fashion, gardening, exploring the world, making and fixing things, cooking, discussion, theatre, street art, and photography. The activities described by both the disengaged groups require skill, practice, and mastery in a more open and dynamic

space with few gatekeepers (Glăveanu, 2018). Offering opportunities for these pursuits can lead to disengaged students being included as active participants with the school culture. This finding builds on the work of Glăveanu (2018) who asserts that 'there is a lot of creativity involved in everyday life activities, from cooking to driving and solving mundane problems at home or at work, and yet this kind of creative expression often flies 'under the radar' of creativity researchers' (p.29). This can be said of teachers and schools as well as of researchers. These everyday pursuits, offered as hands-on and practical activities, could enable a deeper and increasingly interactive engagement (Rice & Lamb, 2008).

These findings build on previous studies that looked at 'hands-on' learning as a means of retaining early school leavers (Rice & Lamb, 2008; DAE, 2012). Those studies noted the effectiveness of hands-on learning as a strategy to re-engage at-risk students. According to Deloitte's report (DAE, 2012), the benefits were not only economic but led to 'improved health outcomes and life satisfaction, reduced criminal behaviour, and breaking the intergenerational cycle of poor participation in education' (p.22). That said, disengaged students selected Humanities (60.9%), Social Relations (58.7%), Sports (58%), Arts (54.7%), and Information and Communication Technology (ICT) (52.5%) as domains of their creative expression. Results suggest that the Disengaged students are more inclined to create artefacts in cultures less aligned to academic orthodoxy, that is, in areas other than Maths, Science, languages and writing, although many enjoy Humanities. This enjoyment of studying society is coupled with their preference for expressing creativity through their social relations.

6.1.7 Developing Learning Profiles

The previous analysis compared discrete elements of three groups of students in relation to their educational context. To further explore aspects of engagement and disengagement, it is beneficial to look at the results of the cluster analysis. Previous

approaches looking at disengagement have used latent profile analysis, which is like cluster analysis but used for different purposes. Wang and Peck (2013), for example, investigated latent clusters of engagement which were associated differentially with educational and psychological functioning. Psychological functioning in Wang and Peck's study is defined as psychological adjustment, in mental health terms. Many approaches neglect the underlying cognitive processess associated with disengagement from classroom learning; that is, the learning characteritics relating to cognition. Previous research has focused on non-cognitive elements of disengagement such as effort, interest, persistence, withdrawal, identity, boredom, and frustration (Skinner et al., 2008; Lund Dean & Jolly, 2012; List, 2017). The approach taken here differs from these studies in that it combines both cognitive and non-cognitive factors into a relational framework. While the previous section illustrated some general patterns, this next section looks to explain some of the variation possibly missed in the previous engagement groupings. The cluster analysis led to six distinct groups.

Cluster 1 contained the most diverse spread of students: CE (*n* = 17), CD (*n* = 17), and SD (*n* = 11). These students have an average academic learning capacity as evidenced by their moderate scores on sequential, crystallised, and basic fluid thinking actions. They scored low on complex fluid thinking and low on measures of creative thinking actions. This group represents the middle band of students in terms of performing the types of thinking actions measured in this project. More broadly, being able to perform these thinking actions means these students can replicate the particular cultural ways of thinking about and doing reading and writing (Street & Martin-Jones, 2000). This group had a moderately positive view in terms of the culture of the classroom being a place to develop their creative ability.

Cluster 2 contained only 7 students: CE (*n* = 5), CD (*n* = 1), and SD (*n* = 1). These students appeared to be high ability when looking at their crystallised and complex fluid

thinking actions; however, their sequential thinking actions were only at moderate level. These students performed to the highest level on the *Broken Cup* task, adding to their high capacity to produce creative outcomes in school. Interestingly, this group reported high levels of unusual perception. In chapter two, this characteristic was shown to be linked to creativity. Another interesting consideration relates to their perception of opportunities to be creative. This cluster perceived fewer opportunities in classroom to be creative, yet they performed to a high degree on the *Broken Cup Task*. This suggests they are able to be creative but feel they could have more opportunities to develop their creative ability.

Cluster 3 (*n = 4*) stood out given the Very low/low level of Academic and Creative thinking actions except for open figural drawing. The distribution of this group is a surprise given it contains more Classroom Engaged students (n= 3) than School Disengaged (n= 1). With a small sample general statements may be erroneous. That said, when encountering students with such low level academic and creative thinking actions, attention should be directed toward developing interactions and transactions that allow these students to access cultural knowledge in the classroom. While these students displayed low level academic thinking actions, they may still be engaged in school because they receive additional support.

Cluster 4 contained 48 students, that is, CE (*n* = 36), CD (*n* = 8), and SD (*n* = 4). These students are strong across most of the measures, displaying high academic thinking, high sequential thinking, and high creative actions and unusual perception. These finding makes sense in light of the unusual perceptual experiences/magical thinking construct being correlated creative thinking (Furnham et al., 2009). This learning profile indicates that this group can perform the thinking actions required to produce appropriate artefacts in a regular classroom. While some of the students in this group are disengaged, the group reported that their classroom was a place to be creative.

Cluster 5 (n = 18) is typified by their Low academic and low creative thinking actions in so far as they scored lowest on Sequential Thinking Action and Total Display of Creative Action measures. Distribution within this group is varied with all three groups represented: Classroom Engaged (*n*= 3), Classroom Disengaged (*n*= 5), and School Disengaged (*n*= 10) with a total of 18 (male *n*= 15, female, *n*= 3). Interestingly, these students reported high levels of self-efficacy and extrinsic motivation but felt their classroom could provide more opportunities to practise their creativity.

Cluster 6 (*n =3*) contained a mix of the three engagement categories. This cluster clearly struggle with sequential thinking actions. As reported above, sequential thinking was the most important factor for creative outcomes while also being a fundamental thinking action involved in regular classroom learning. While clusters 3, 5, 6 were weak in complex thinking actions, group 6 scored high on basic fluid thinking actions and low to moderate on creative thinking actions.

6.1.8 Summary of hypothesis 1

Classroom Engaged students showed competency in thinking actions that matched those required for success at school. This points to the conclusion that the learning profiles of Classroom Engaged students is most aligned to school expectations. They were connected to school, believing that it was a place for them to improve their creativity with tests that measure what they can do. They were less impulsive and were able to focus attention on important elements of tasks. Further, they were more likely to express their creative thinking in academic subjects. They believed that school did not offer the time and space to be creative.

Classroom Disengaged students showed clear strength in basic fluid thinking; however, this did not carry over into other thinking actions. When compared to the other

groups, the CD group performed Sequential Thinking, Crystallised Thinking, and Creative Thinking Actions to a significantly lower level. More specifically, verbal generative ability and general inferential ability, with a low total score on creative outcomes. The disengaged students reported low connectedness to school and behavioural disengagement. They perceived a mismatch between themselves and the tasks of their classroom and were most likely to be impulsive.

The School Disengaged group performed to the lowest level across all four measures of academic thinking measures. These students were once alienated from regular schools, but they have found a place in alternative settings. While these students are called school disengaged, they may be alternative school engaged. SD are likely to have missed substantial amounts of schooling, many of them having experienced trauma or other causes of disruption to their formal education. These students report having less economic capital than the other two groups; however, they perceive their classroom as a positive space to be creative. As a group, the CD and SD prefer hands-on learning and modes of expression that lead to informal artefacts.

Understanding disengagement involves understanding how the disengaged individual perceives the symbolic and material affordances within their classroom. Increasing the likelihood of students sharing their thinking with teachers, their audience, depends on the past successes of students within and outside the classroom. The results so far have shown that when a student is not able to access important cultural information in their classroom, then it is likely that student will not be able act appropriately. Constant failure in the eyes of the audience makes it very difficult for the actor to feel connected to a culture that sees them negatively.

6.2 Hypothsesis 2: For High Ability students, High Ability Engaged Students differ from High Ability Disengaged students and Average Ability students in the following ways: specific Thinking Actions (Learning and Creative Actions) and their perception of Actor, Audiences, and Affordances.

To investigate hypothesis 2, the top 15% of students were grouped into engaged and disengaged categories. These students are typically recognised as high ability or gifted students, as explained in chapter 2. It was hypothesised that differences between high ability engaged and disengaged students' learning profiles would affect their participation in, and engagement with, classroom learning.

6.2.1 Actions and High Ability students

As reported in the previous chapter, implicit theories of creativity held by both disengaged and engaged high ability students mentioned actions most frequently, followed by actor, audience, and artefacts. Affordances were rated as low. These results support the importance of understanding the role of actions in creativity. Interestingly, many of the responses did not refer to school. These results further reinforce the importance of understanding the doing element of being creative. As Glăveanu (2013) argues, 'creativity is not as a 'thing' but an action in and on the world'. High ability students in this study agree.

6.2.2 Comparing Academic Thinking Actions between Ability and Engagement Groups

The High Ability Engaged (HAE) students scored higher on measures of Crystallised Thinking Actions and Complex Fluid Thinking Actions, and higher on Basic Fluid Thinking Actions, though not to a significant level. While these differences were not statistically significant, these results suggest high ability students are not all the same. The HAE and High Ability Disengaged (HAD) students significantly differed on only one of the academic thinking actions, that is, sequential thinking actions ($p < .01$). These results suggest that the

disengagement of high ability students with classroom learning is less about crystallised and fluid thinking and more related to sequential thinking actions. This is an important finding because it is clear that with a standard deviation of 12, the HAD group is a diverse group with many of these students functioning at levels expected of average ability students. This supports the proposition that general ability tests, when used as a sole identification tool, are insufficient to gauge what a student can do (Sternberg, 2010a). Further to this, given the importance of sequential processing in classrooms, HAD students' may not be able to meet classroom demands and miss vital information and cues (Munro, 2011; VanTassel-Baska, 2018).

This also points to another implication from this study, identifying high ability students solely through written tests does not gauge their capacity to learn within academic classroom cultures. It is argued that a student may perform to a high level on entrance exams but struggle with classroom demands due to sequential processing issues. This highlights the difference between classroom learning and entrance exams. This issue was clear in the case of a participant in the current study. He scored within the top 10% on fluid and crystallised thinking, but his sequential thinking level was 4 years lower than expected. When asked about his experience in class, he said that he was rarely able to follow the teacher, always asking his friends for the instructions. Munro (2002) showed that these learners have difficulty retaining unrelated information in auditory sequential short-term memory and in learning visual symbolic codes (p.158). The findings in the current study that showing some disengaged students have processing issues confirms that of Munro (2002) in relation to high ability students with learning difficulties. These characteristics are also typical of readers who have learning disabilities (Rasinski, 1984). Further, Munro (2005a) showed that processing deficits are an important factor in understanding the underachievement and disengagement of high

ability students from classroom learning. High ability disengaged students may be unable to excel in literacy events with these difficulties, even though they show high scores on fluid and crystallised thinking actions.

6.2.3 Comparing Creative Thinking Actions between Ability and Engagement Groups

Two significant differences emerged between the engaged and disengaged high ability groups: in Inferential Thinking actions on the *Broken Cup* task ($p < .01$) and in Total Display of Creative Actions ($p < .05$). As described above, the inferential thinking required on the Broken Cup task differs from that of the social problem task. The High Ability Engaged (HAE) group scored significantly higher than the High Ability Disengaged (HAD) group on general Inferential Thinking actions ($p < .01$). No clear difference emerged between the high ability students on Social Problem-Detecting and Inferential Thinking; however, there is a clear difference between both High Ability groups and the Average Ability (AA) group. The differences between High Ability and Average Ability students highlight a fundamental capacity that can help identify high ability students, that is, ability with inferential thinking actions. This confirms Munro's (2015) research showing that high ability students perform to a higher level on tasks asking for inferential thinking.

The second difference relates to the total scores on the creative thinking action assessments. There was a significant difference between the disengaged and engaged high ability groups. The HAE group performed to a higher level than the HAD group. That said, both the HAE and HAD groups outperformed the AA groups to a significant level ($p < .01$). These results suggest that using tasks that measure inferential thinking can help teachers to identify aspects of the learning profile for high ability students regardless of their engagement level. These findings extend current understandings of the learning profile for high abilities students. Cho et al. (2010) suggested that 'crystallized knowledge can be used as a resource

for the mental operation of creativity' (p.134); however, the HAE group produced creative artefacts to a higher standard even though there were no significant differences between the scores on standardised intelligence assessments that tested crystallised and fluid thinking actions. Using the regression analysis results for hypothesis 3, the differences in total scores appear to result from the disparity between the groups' sequential thinking actions (.000), more than from Crystallised Thinking Actions (.003), and Complex Fluid Thinking Actions (.004). Interestingly, regression analysis also showed scores on the *Broken Cup* task were predicted by Complex Fluid Thinking Actions (.000), Crystallised Thinking Actions (.001), and Sequential Thinking Actions (.007).

6.2.4 Comparing Actor Attributes between Ability and Engagement Groups

Only one significant difference emerged from the analysis of non-cognitive factors. Specifically, the High Ability Engaged group reported being behaviourally engaged with their Classroom Culture in contrast to the High Ability Disengaged group ($p < .05$) who were not. This confirms Munro's (2011) assertion that alienated and marginalised high ability students often display low academic motivation or engagement in school (Munro, 2011). Interestingly, there was a clear pattern between the HAE and HAD groups in relation to perceiving a mismatch with their classroom culture; the HAD students were most likely to perceive themselves as being a poor fit with the artefacts and affordances offered in their classroom culture.

Taken together, the disengaged group were thus more prone to having a negative perception of schooling. Again, this confirms previous research showing that Disengaged High Ability students are more likely to infer a mismatch between their learning capacity and classroom demands (Redding, 1989; VanTassel-Baska, 2018). VanTassel-Baska (2018) highlights the disparity between classroom learning and disengaged students' verbal capacity.

The differences are exacerbated in HAD students who tend to act and think in unconventional ways (Kim & VanTassel-Baska, 2010). Disengagement is thus more likely to result from poor environmental fit between the actor, their actions, and the affordances, audience, and artefacts in the classroom.

6.2.5 Audience, Affordances, Artefacts and High Ability

To further understand the perspectives of the high ability students, the researcher asked the participants to identify aspects of school that could assist the development and expression of their creativity. interestingly, when students defined creativity, actions emerged as the most prominent theme. In the qualitative analysis, *affordances* were mentioned most frequently, followed by Audience, Actions, Actors, and Artefacts. Key themes from these two groups in relation to how school can adapt to enable students to display their creativity provide a clear picture of students' beliefs about their educational context. While the the student believed actions are central to creativity, they reported that affordances and their audience as crucial to creative development.

6.2.5.1 Action dimension

Both groups of high ability students mention *exploration*, *hands-on learning*, and the *recognition* of *difference and diversity* as important features of a creative classroom culture. For disengaged students, cultures which afford students the opportunity to focus on their own learning help greatly. These students mention teachers being open-minded and focused on learning, not just on results. This suggests they are sensitive to Action-Audience relations, that is, teacher (audience) actions, as a transaction of value. This finding echoes Johnson (2008) who found students prefer teachers who care about them as humans.

Engaged students focus more on Academic and Creative Actions and less on being accepted by the audience. They valued social interaction, opportunities to exercise choice,

and effective questions from teachers. They value active learning, problem-solving tasks, and activities that allow for designing things. This echoes Furrer and Skinner (2003) who demonstrated that children with a higher sense of relatedness showed higher levels of emotional and behavioural engagement. When a student is connected, it can be inferred that their actions are valued by their audience.

6.2.5.2 Actor dimension

Both groups mentioned having more say, more freedom, more opportunity for self-expression, and a desire that teachers connect with them, all confirming Glăveanu's (2014) argument about the cultural life of an object: he said that 'negotiating a place for new artefacts requires dialogue, cooperation and also divergence of opinion' (Glăveanu, 2014 p.54). These themes highlight the importance of the Actor having a strong sense of agency, being able to connect with the audience (teachers in this case), and being able to express themselves freely (to maintain positive relations with their audience). This points to Amabile's (1996) work which argued divergent thinking requires resistance to group pressure as well as recognising that stimulating, supportive, and positively challenging environments enable creativity to be nurtured in a positive way.

For disengaged students, Actor-Audience relations emerged in the form of inclusion, acceptance, and participation. They saw increasing their skills as important for being creative at school, and they believed that enjoying school is important. In contrast, engaged students mentioned their interests as important when choosing learning topics. This confirms previous research showing that providing students with appropriate levels of autonomy is more likely to lead to student engagement than will punishment for non-conformity (Elffers,2011; Fredricks et al., 2004; Morrison & Allen, 2007; Walker & Graham, 2019). This points to the possibility that many students will engage and develop their creative ability in the appropriate

environment. What they require from teachers are symbolic affordances such as social inclusion and validation.

The engaged students felt school could better support them to be creative if there was less pressure to succeed and conform. There is clear resistance to the academic focus found in many classrooms, with High Ability students appearing sensitive to the social validation of their artefact by the Audience. This confirms Amabile's (1996) research which shows that creativity can be nurtured in supportive environments that are stimulating and positively challenging.

6.2.5.3 Affordances dimension

Both groups mentioned facilitation of hands-on learning (in the form of materials and facilities) and more opportunities to be creative. These two themes confirm the importance of opportunities to exploit the symbolic and material affordances within the culture to create new artefacts. Barab and Plucker (2002) highlight the centrality of perceiving opportunities within the environment to improve one's capacity to act. For some of these students, increasing opportunities to participate entails a greater choice of subjects and a focus on supporting their creative development.

Actor-affordance relations position the teacher as the provider of opportunities within their classroom. This suggests students recognise the teacher as 'Gatekeeper', confirming previous research of Csikszentmihalyi (1998) which situates the teacher as gatekeeper of the culture in their classroom. Teachers influence not only the types of things students think about, but also how and when students' creative ideation is translated into an artefact (Runco, 2007). For many engaged students, less structured classroom cultures, more excursions, and less textbook-focused learning were reported as supportive of their creative development. Additionally, both groups alluded to an increase in Arts-based subjects.

Responses from Disengaged students indicated an emphasis on material affordances in the form of technology, assessments, and space to design and create artefacts.

6.2.5.4 Artefact dimension

The responses from high ability students show the importance of actor-audience-artefact relations and expressions of creative thinking. The students suggested school can help their creative development by affording the students greater choice when creating artefacts. The students described their teachers as the person who determines how and what the artefact shuld look like in their classroom. This echoes Fredricks' (2014) assertion pertaining to the reproductive nature of schooling.

The engaged students desired further enculturation into what they saw as 'creative culture' by suggesting that they would benefit from sharing their artefacts with others, but also by visiting galleries and museums to see other creative artefacts. This suggests engaged students' notions of 'creative' align with those of formal education. Students implicitly recognise, in relation to artefacts, that 'the activities of prior generations are cumulated in the present' (Cole, 1996 p.144). From a sociocultural perspective, the artefacts defined as 'useful and/or valued learning' in the curriculum are passed on to subsequent generations (Seddon, 2001).

Disengaged students further reported a preference for artefacts in non academic domains. For these students, material objects that result from applying some set of skills such as plumbing, wood tech, drawing, and painting are worth creating. Interestingly, Glăveanu's (2018) assertion that everyday activities are often overlooked in creative research holds true given the lack of research into creativity in fields such as construction and plumbing.

Based on a longitudinal study following highly able youth in academic and sports domains, Fredricks et al. (2010) reported that students were more likely to be passionate

about domains such as sports and arts. This passion was absent in the academic highly ability students (Fredricks et al., 2010). The authors found 'that school settings, and especially regular classrooms as compared with gifted and advanced classes, appeared to undermine rather that support passion' (p.18). Confirming this finding, disengaged students in the current study requested developing their creative ability in non academic domains.

The final theme to emerge from the disengaged students' responses centred on the relationship between creativity and a change in personal knowledge. This reflects the general pattern of disengaged students mentioned above, that they prefer out-of-schoool contexts when being creative. Of interest here is Forgeard and Mecklenburg's (2013) multidimensional framework of motivation. Specifically, disengaged students appeared to be intrinsically motivated by a focus on personal growth. This is counter to expectations of school which primarily views grades and academic achievement as motivators. It confirms Fredricks' (2014) assertion that more flexibility in terms of the how students complete tasks in classrooms can assist in re-engaging students by allowing them to gain insight and personal knowledge, as opposed to scoring good grades in return for producing artefacts.

6.2.5.5 Audience dimension

Students recognised the importance of socio-cultural relations in their classroom. Both groups of students recommend that teachers encourage individual diversity and independence in students. This means supporting students who are diverse in how they look and think. This recommendation confirms commonly-held beliefs of researchers into creativity who argue that highly creative students act and think in unconventional ways, identify problems, or question authority (Kim, 2008, Kim & VanTassel-Baska, 2010; Westby and Dawson 1995). Furthermore, the students in this project confirmed research from

Fredricks et al.'s (2010) synthesis of research on passion in classrooms. They conclude that students are more likely to experience passion in classrooms:

> (a) where teachers and peers create a caring environment, supporting the need for relatedness; (b) where students have choice and relative freedom from external controls such as rewards and grades, supporting the need for autonomy; and (c) where feedback is clear and students have information on how to achieve desired outcomes, supporting the need for competence' (Fredricks et al., 2010, p.21).

More recently, Runco's (2014) research found that creativity requires unconventional, nonconformist, and individualistic ways of thinking. Both groups of students mentioned teachers understanding and connecting with students (as people) through less demeaning and/or aggressive interactions. Both groups showed a desire to have more approachable teachers, confirming current research which shows warm and supportive teachers and positive and constructive feedback positively influence engagement, effort, perseverance, and achievement (Amabile et al., 1999; Shah & Ali, 2012).

Further, positive teacher-student relationships with at-risk students increases the likelihood of positive school outcomes (Jennings & Greenberg, 2008; Pianta & Allen, 2008; Sointu, 2017). This was clearly shown by Slade's (2001) research focusing on the education of boys. Focus groups with 1800 students, teachers and parents in more than 100 schools around Australia, showed students believed that there are too many 'bad teachers' who either create or exacerbate their problems because they are culturally inconsistent, out of date, and more concerned with maintaining the status quo.

Disengaged students' focus is on social relations with the teacher. This is important to acknowledge given engagement usually decreases as a student progresses through formal schooling (Fredricks et al., 2004; Klem & Connell, 2004). Roorda et al. (2017) found that secondary school students are more sensitive to positive teacher-student relationships than are primary school students. Similarly, engaged students are concerned with the social aspects of creativity, though their focus is on sharing and collaborating with peers rather than on developing a better relationship with teachers. Teachers were seen as a hinderance rather than helpful confirming Slade's (2001) research showing disengaged boys feel school does not care about them.

Finally, engaged students highlight the relationship between audience and affordances in the form of 'program design'. The teacher as program designer (actor) provides opportunities for the student to be creative and to then be assessed (teacher as audience). This builds on Gowing and Jackson's (2016) finding that many students define their connection to school through 'the opportunities given to them by the school: 'relational (peers and staff), activity-based (extra- and co-curricular), and academic (learning) domains' (p.64). Furthermore, the importance of this finding is clear in light of current understandings of high ability studies. Specifically, Subotnik et al. (2011) argue outstanding performance largely depends on opportunities available to the individual. That is, 'opportunity provides a context for talent to be nurtured, sometimes even before it is recognized' (Subotnik et al., 2011, p.20). The high abilty students in the present study requested programs with more opportunities to devlop their creativity, implying that current programs are insufficient for this purpose. This points to the connection between symbolic and material affordances. While material affordances might be present in the classroom enviroment, the symbolic affordances

shape norms relating to perceptions, interactions, and transactions within that culture, leading the student to believe their classroom is lacking opportunity.

6.2.6 High Ability Learning Profiles

In the previous section, the cluster analysis investigating patterns within the whole cohort were discussed. In this section, the results of the cluster analysis treating only the high ability group is discussed. As stated above, using the simple categorisation of HAD and HAE groupings leads to a limited understanding of differences in the high ability students. Using the dichotomy of engaged versus disengaged is fruitful yet limited given engagement occurs on a spectrum. Using data from the cluster analysis presented in the last chapter, characteristics of the high ability students can be dissected. The results of the cluster analysis indicated 5 distinct groups.

6.2.6.1 High Ability Profile 1

Spread of domain of ability is Global (*n*=5), Verbal (*n*=2), and Non-Verbal (*n*=7). These students showed a well-rounded learning profile, scoring highest on total Creative Thinking Actions, high level Complex Fluid Thinking, Crystallised Thinking Actions, and Sequential Thinking Actions. They were weakest at social inferential thinking; they wrote large responses on the social problem task, though not to a high quality, suggesting they were able to utilise crystallised and sequential thinking actions more than inferential thinking in a social context.

In terms of their classroom culture, they saw many opportunities to work collaboratively and practise their creativity. This may have fed their perception of a positive culture for creative expression. They report being connected to their audience yet having a low concern for their teacher's opinion. Interestingly, they report high levels of unusual perception but low levels of creative self-efficacy.

6.2.6.2 High Ability Profile 2

This group contains only high ability students from the non-verbal domain as measured through fluid thinking. These students would struggle with verbal tasks in a classroom without proper support given that they scored lowest on Crystallised and Sequential thinking. Even though they reported high levels of creative self-efficacy, their total creative actions score was lowest with an obvious strength on the *Broken Cup* task. This suggests their creative self-efficacy is not based on formal creative expression and may result from out-of-school endeavours.

Further to this, students with this profile scored low on unusual perception, perception of positive classroom culture, emotional sensitivity, behavioural engagement, and motivation to help others. They perceive a lack of time and space for creative pursuits, see few opportunities to work collaboratively with their peers or practise their creativity, are disconnected from their classroom culture, and do not care about their teacher's opinion (Audience). This group is disengaged from their classroom culture. Their learner profile indicated a mismatch between their ability and the material and symbolic affordances in their classroom.

6.2.6.3 High Ability Profile 3

The Spread of Domain of Ability is Global (*n*=12), Verbal (*n*=6), and Non-Verbal (*n*=10). This group scored comparatively highly on Sequential Thinking Actions and moderately on crystallised thinking. With moderate creative self-efficacy scores, these students scored to a high level on Total Creative, showing a robust capacity to be creative in multiple ways. With high levels of unusual perception and emotional sensitivity apparent, the results suggest they may experience positive Schizotypy. Even though they report perceiving many opportunities to be creative, they believe their classroom does not offer a positive creative culture, and they

are disconnected from their audience. This group exhibits a learner profile that suggests they are disengaged from classroom learning dues to their relationship with the audience.

6.2.6.4 High Ability Profile 4

This group, with the largest spread of domain of ability, contains Global (*n*=12), Verbal (*n*=6), and Non-Verbal (*n*=12) students. With moderate levels of creative self-efficacy, they are generally strong in terms of being able to perform academic and verbal creative thinking actions. Their most obvious strength is Sequential Thinking. High behavioural engagement with their classroom is evident, and they perceive opportunities to work collaboratively with their peers and use their creativity. They are motivated extrinsically, report low emotional sensitivity, and exhibit low and unusual perceptions. This suggests their thinking is clear and that they employ stable self-regulatory and attentional processes. Sequential Thinking Actions require these attributes, as do Complex Fluid Thinking Actions. Furthermore, they appear as easily programmable by teachers given their higher ability to follow verbal instructions.

6.2.6.5 High Ability Profile 5

This final group scored highest on Complex Fluid Thinking and Crystallised Thinking measures, with moderate Sequential Thinking Actions and Total Display of Creative Thinking actions. With a high level of creative self-efficacy, they showed the highest capacity to think inferentially and divergently.

They were most disengaged from classroom learning while moderately caring about their teacher's opinion of their creative artefacts. Their characteristics included moderate perception of positive classroom culture and opportunities to work collaboratively for creative purposes, plus moderate motivation to create for social gain. With moderate unusual

perceptions and low emotional sensitivity, their thinking is clear and attentive. This enabled high performance on complex thinking actions.

6.2.7 Summary of Hypothesis 2

When understanding the disengagement of high ability students, some fundamental elements of their learning profile need to be understood. Comparing the two high ability groups showed important differences. These differences were apparent in Sequential Thinking Actions, General Inferential Thinking actions, and Total Display of Creative Actions. The most common theme to emerge was in relation to actions, with both groups indicating their belief that being creative involved 'doing' creativity.

The disengaged high ability group felt marginalised, reporting low academic motivation, and low engagement with school. All high ability students valued inclusive classroom cultures that fostered positive social interactions, expression of choice, effective questions from teachers, constructive feedback, active learning, problem-solving tasks, and activities that allowed for designing and making artefacts. Some of the differences between groups highlighted the importance of culture to the extent that the engaged group requested a focus on enculturation into orthodoxy. By contrast, the disengaged students saw creativity as a way to develop their personal knowledge.

6.3 Hypothesis 3: Some combinations of cognitive and Actor, Affordance, and Audience factors are more likely to lead to higher displays of creativity

Hypothesis 3 investigates factors involved in creative expression in a classroom culture. The findings in the current study show that developing students' creative ability is not merely a matter of focusing on divergent thinking or teaching creativity strategies. The traditional polarisation of convergent and divergent thinking is misleading because 'cognition and movement require organization of concurrent and interactive sequences. Where there is

a need for order there is a need for decision, and where there is a need for decision there must be a criterion to make that decision' (Damasio 2008, pp.199-200).

Dietrich (2007) argues that this approach is problematic because the term 'divergent thinking is too broad and needs to be deconstructed' (p.23). He goes on to say that 'with the exception of working memory in prefrontal regions, which is capable of generating novelty from information normally coded elsewhere in the brain, the recombination of bits and pieces of information into novel configurations must come from the very neural circuits that store those bits of information' (p.25). Further, Kaufman's (2009, 2011) dual-process theory of intelligence defines intelligence as the ability to switch attention between implicit and explicit modes of thought depending on environmental constraints including task demands (Gabora, 2003, 2010; Gabora & Kaufman, 2010). Creative thinking thus seems to be a normal thinking process that is judged as 'creative' within a specific culture.

6.3.1 Creative Artefact in a Classroom Culture

The linear regression results suggest that creative expression in this study is underpinned by information processing in the form of sequential thinking actions (.000). This confirms Dietrich's (2004) assertion that 'creativity is grounded in normal mental processes' (p.1). In order to understand the breakdown of the actions contributing to the total creative score, regression analysis was carried out for each of the tasks. Interestingly, sequential thinking actions emerged as the strongest predictor of scores on the Social Problem-Solving (.000), Figural Drawing (.000), and Divergent Thinking fluency on Alternative uses (.000) tasks. Crystallised Thinking Actions predicted total creativity scores (.003). The exception was on the *Broken Cup* task where Complex Fluid Thinking (.000) and Crystallised Thinking (.001) were shown to be stronger predictors than sequential thinking (.007). These results also partially confirm previous research from Cho et al. (2010) which suggested that 'the association

between intelligence tests and creativity tests may be made because it is possible to use crystallized knowledge as a resource for the mental operation of creativity' (p.134).

Further, the capacity to control impulses predicted total creativity scores (.002), as did having creative drives and goals (.016), unusual Perception/magical Thinking (.016), and valuing creative actions (.024). These results confirm research from Wright et al. (2007) which suggests that the ability to respond to impulses is important for fluid thinking. The issue may not be the capacity for impulsive thinking per se, but the inability to contain these impulses within specific contexts.

These results seem to challenge Batey and Furnham (2008) who found that impulsive nonconformity correlates with creative personality, self-rating of creativity, and creative achievement. The present study extends current knowledge as this previous study did not measure creative performance; rather it measured the participants' beliefs about themselves as creative through self-report. Impulsive nonconformity is important considering previous research linking the trait to low latent inhibition and poor attention (Granger et al., 2016; Prabhakaran et al., 2013). Interestingly, higher dopamine levels may lower latent inhibition (Andrew et al., 2005) but stimulate seeking and producing novelty via divergent thinking (Dietrich, 2004, 2007; Naber et al., 2013; Schweizer, 2006).

For the generation of novel artefacts, a degree of attentional control is necessary to exploit the benefits of low latent inhibition: see old stimuli in new ways and not conforming to cultural norms around use of affordances. This might be explained by research from Brinthaupt (2019) which showed a significant positive correlation between positive and disorganised schizotypy and self-talk factors. Thinking metaphorically about this, being able to control a wild horse might lead to greater capacity as a jockey as opposed to managing a tame horse that requires little skill.

Having goals and drives to be creative suggests an appreciation of creativity, and may assist with keeping the horse on track, with strong self-talk, to finish the race even though the horse at times wants to jump the barrier and run through the crowd. This also makes sense given classroom cultures often prefer conformity, as suggested by Sternberg (2001): 'parents, teachers, supervisors, and others who appreciate creative work are more likely to appreciate the forward-incremental type of creativity that builds on existing ideas than they are to appreciate the redirecting or reinitiating kinds of creativity that defy existing ideas' (p.361).

6.3.2 Summary of Hypothesis 3

Creative actions in a classroom occur in response to the material and symbolic affordances of an artefact. For these expressions to be deemed creative in a formal sense, the audience would have to value these expressions. The better a student is able to perform actions in an expected way, the more likely they will be accepted. According to the findings above, essential to this expression is the basic capacity to process information sequentially. Sequential thinking is not only essential for understanding the affordances of the artefact, as communicated through verbal instructions, but also for producing artefacts as expected by the audience.

In this chapter, it has been argued that understanding disengagement involves understanding how students perceive the symbolic and material affordances in their classroom. When a student accesses important cultural information in their classroom, their actions are more likely to align with their teacher's expectations. The high ability groups showed important differences. These differences were apparent in Sequential Thinking Actions, General Inferential Thinking actions, and Total Display of Creative Actions.

The most common theme to emerge from the thematic analysis was in relation to actions, with both groups indicating their belief that being creative involved 'doing' creativity. The thematic analysis also showed high ability students valued inclusive classroom cultures that fostered positive social interactions, diversity, constructive feedback, active learning, and problem-solving tasks. The next chapter explains the implications of these findings before concluding remarks are made.

Chapter 7

Implications and Conclusion

7.1 Contribution of the present study

The issue presented as the rationale for this study was framed around Highly Ability students disengaging from some classroom cultures. There was a presumption, based on current literature, that this was due to limited opportunities for action in their classrooms. It was hypothesised that Classroom Engaged (CE) students differed from Classroom Disengaged (CD) students in their learning profile. Predictions were similar for the High Ability students. The differences discussed in previous chapters point to why some students appear to not 'fit' into some classroom cultures based on how they perceive and respond to affordances in their classroom. It was further hypothesised that some combinations of Thinking Actions, Actor, Affordances, Artefacts, and Audience factors were likely to lead to higher displays of Creative Actions in formal classroom cultures. The implications of this study's findings in relation to these hypotheses will be discussed below.

The first significant implication of this study relates to how engagement is conceived. The common conception of engagement as *behavioural* engagement, *emotional/affective* engagement, and *cognitive* engagement (Fredricks et al., 2011), becomes insufficient to understand the problem of disengagement because it implies that 'engagement' is only 'of' the individual. Moving beyond this individualistic conception of engagement, a new definition of engagement is proposed. This new definition is dynamic and relational and can be read as an extension of Barab and Plucker (2002) who argue displays of talented behaviour involve 'understanding how to act in a manner that is consistent with those ways that have been socioculturally endorsed—that is, functional for a particular group' (p.174). The new

definition to emerge from this research includes affordances and artefacts in relation to how these elements match the actions of the student. The new definition is as follows:

Classroom engagement is a relational concept that represents the transactions and interactions between a student and their teacher, the symbolic and material affordances, and artefacts within a specific classroom or school culture. In other words, engagement requires appropriate perception and exploitation of symbolic and material affordances in the form of culturally acceptable patterns of actions, during socially and materially situated activities, when creating artefacts in their classroom.

In this thesis, attention has been directed towards understanding the learning profile of engaged and disengaged students and their perception of the affordances, audience, and artefacts in their classroom environment. It is important to note that this study does not attempt to contribute to the debate on the definition of 'true' giftedness (Cropley, 1994) or the origins of giftedness (Gagné, 2013). With the focus on students' thinking actions and their perceptions of opportunities for action, the discussion so far extended previous research examining appropriate ways of identifying and supporting high ability students and the socio-cultural conditions in which they will thrive (Ford et al., 2008; Munro, 2012). This study also aims to support student participation at school and achievement of the goals set out in the Alice Springs (Mparntwe) Education Declaration (2019) which prioritise promoting excellence and equity as well as supporting 'all young Australians to become confident and creative individuals, successful lifelong learners, and active and informed members of the community' (p.6).

Researchers such as VanTassel-Baska (2018), Shavinina (2010), Munro (2011), and Zieglar (2013) have argued for the need to better understand of the ways in which high ability students learn. In seeking such an understanding, this study has reconceptualised

engagement as a product of relations between the components, not a product of components in isolation, based on the Five A's conception of creativity (Glăveanu, 2015). Consequently, engagement emerges as a complex phenomenon that describes the relations and interactions between a student and the affordances, artefacts, and audiences when they participate in their classroom.

Implications for Engagement/Achievement will be discussed in 7.1.1. Once these implications have been unpacked, implications for wellbeing will be discussed in 7.1.2. These implications point to the need for further research and discussion in terms of how schools and teachers can respond to disengagement.

7.1.1. Implications for Engagement

A lack of differentiated instruction and poor classroom management strategies reduce a student's learning outcomes (Brouwers & Tomic, 2000; Landis, 2013; Siegle et al., 2014; Watters, 2010). Applying a relational perspective to engage students involves understanding how elements of the five dimensions in the student's learning profile interact. Three important implications will be discussed below. More specifically, the following three topics will be addressed:

- Engaging disengaged students
- Engaging disengaged high ability students
- Creative Engagement in Academic Classrooms using the Five A's

7.1.1.1 Engaging Disengaged Students

The first implication relates to how engagement and achievement are perceived by disengaged students. Achievement is a sociocultural judgement based on institutional expectations that rewards reproduction of formal cultural patterns of behaviour. From a linear conception of action, achievement occurs at the end of the process of engagement, just

as the creative product results from the creative process. The formalised end of this process, bestowing an achievement on a student, is recognition that the process is complete. School achievement is thus a cultural recognition of the end of learning in a formal culture marked by students receiving a reward (such as School Dux) or recognition for acting in accordance with an audience's criteria, in relation to the affordances of an artefact.

A second implication relates to engagement. The previous sections defined an 'engaged' student as conforming to a set of behavioural patterns that correspond to audience expectations and are endorsed by the school. This points to a tension between intrinsic motivation and classroom engagement. An intrinsically motivated student is more inclined to follow their own drives, are less likely to reproduce classroom norms, and less driven by external reward. High achieving students may appear intrinsically motivated because they have internalised socio-culturally endorsed patterns of behaviour, values, and beliefs of the school. This implies that student disengagement is not just about effort or having the 'right' attitude or mindset. Instead, these attributes are more like symptoms indicating a feeling of disconnection and a mismatch with the classroom culture. Providing students with opportunities to participate within a classroom will enable the student to direct their drive and motivation to engage with the symbolic and material affordances in a fruitful way. This approach is far more effective than leveraging power as a mechanism of control to achieve compliance.

It was shown in chapter two that some students cannot act in accordance with expected patterns of behaviour because they learn differently to what has been deemed normal. Such differences emerge for different reasons: cognitive, non-cognitive, or a combination of these. It seems that these differences manifest clearly in a preference for hands-on learning opportunities. Interestingly, 'hands-on' learning is characteristically non-

sequential. Disengaged students felt like they did not fit into their classroom and they preferred to show their creative ability in places other than school. As a group, the disengaged students preferred informal domains of creative expression that were 'hands-on' and less affiliated with formal schooling. The challenge raised by this project becomes one of engaging students through creating appropriate learning environments in both material and symbolic terms, within regular classrooms before students become disengaged.

The engaged students in this study showed a tendency to perceive their 'good' fit with their classroom culture. They are a successful embodiment of formal schooling with their 'appropriate forms of cultural display' (McLeod, 2006, p.51). This can also be inferred from the classroom engaged student's competency in academic actions and their preference for expressing their creative thinking in academic subjects. According to this study, 'engaged' is better understood in terms of the actor acting appropriately in response to perceptions of the artefacts, affordances, and audience. When these actions align with the teacher's expectations and cultural norms, these students are labelled as 'engaged' in the formal sense of the word. Framing 'engagement' as a set of socio-culturally-endorsed patterns of behaviour within a classroom culture enables a new way of seeing the issue of 'disengagement'. The starting point for teachers is to reflect on their expectations and assumptions relating to the types of transactions and interactions the constitute these patterns of behaviour within their classroom.

In the present study, sequential processing was the most significant learning characteristic differentiating the participants' abilities to engage with text-based tasks and express creative outcomes. The implication of this difference for teaching is that some students might misinterpret or misunderstand the affordances in their classroom if they have difficulty processing information sequentially. One significant consequence of lower

Sequential Thinking action is that students may misunderstand or completely miss important information by mis-perceiving verbal cues in their classroom. Missing key information during class can have detrimental effects on a student's learning trajectory. This in turn can lead to an inability to produce culturally acceptable artefacts, leading to further disengagement.

To engage students with low sequential thinking actions requires creating an environment in which these students can perceive important cultural information. Teaching a student with sequential processing issues requires consideration of the type of affordances offered, but also attention to how information about affordances is communicated to the student. If a student is to fit into a classroom, access to culturally valued information is crucial.

7.1.1.2 Engaging Disengaged High Ability Students

The results in the current study showed that the engaged high ability students who participated in the study were more likely to display creativity in a regular classroom culture given their capacity to process sequential information. On the other hand, disengaged high ability students showed learning profiles more suited to informal domains that are less reliant on literacy events that privilege formal and academic knowledge. Within these alternative domains, the appropriate perception of an artefact is no longer mediated by the formal institutional conditions.

As mentioned in the previous section, differentiating for all students involves consideration of their learning profile. For high ability students, their Sequential Thinking Actions and General Inferential Thinking actions emerged as important indicators of their capacity to act on affordances within their classroom. Importantly, these two thinking actions were highly implicated in creative expression. This was expected because inferential and sequential thinking are both essential for meaning-making based on information received while listening or reading. It follows that to aid their engagement and knowledge

enhancement, engaging high ability disengaged students involves identifying their sequential and inferential thinking abilities.

Another outcome of this study concerns the implications of high ability students valuing of inclusive classroom cultures, ones that foster positive social interaction, expression of choice, effective questions from teachers, constructive feedback, active and 'hands-on' learning, and problem-solving tasks and activities. It is worth noting the high ability disengaged group felt marginalised, reporting low academic motivation and engagement in school. This could be a response to their previous failed attempts to achieve in formal learning environments. The high ability students were motivated and had learning goals, though not goals associated with formal learning; instead, they showed interest in self-driven projects and preferred creating artefacts to enhance their own knowledge in informal environments. Understanding and integrating relevant topics into classroom teaching will help students connect to the learning and feel valued but also provide students with opportunities to develop their creative ability. Engaging these students requires developing a culture which recognises and supports their current and future situational needs.

7.1.1.3 Creative Engagement in Academic Classrooms using the Five A's

Audience

The selection of the Five A's framework allows for a recentring of the individual within a set of relational networks. Viewing the teacher as audience positions the teacher as a representative of the formal socio-cultural networks found in a classroom context. The students welcomed diversity in their classrooms and recommended that teachers do the same, that is, they wanted teachers to be more approachable and less judgemental when faced with students who do not fit the norms. Thinking in culturally divergent ways according to teacher or school expectations can have serious yet subtle consequences. Goss et al. (2017)

showed that misbehaving students often receive more criticism and punishment and less support and encouragement. This is important because Johnson (2008) argued that regular but relatively minor daily hassles with a teacher can profoundly influence on a student's wellbeing.

While it is important to measure progress, it is also important for the teacher to consider differences in how students relate to the affordances in their classroom. These are important considerations because they align with but also extend the finding that supportive teacher behaviour is positively influential in the development of creativity (Barbot et al., 2011, Baer & Kaufman 2012; Beghetto 2013; Beghetto, 2017; Beghetto & Kaufman 2014, Sak 2004). A hostile audience will have unwilling performers who fear judgement. By empathising with the student, the teacher expands their own understanding of possible patterns of actions and of the cultures that give alternative patterns meaning. An open and accepting classroom culture that is typified by empathy is thus an essential ingredient for engaging students and supporting their creativity development.

Development of student's creative ability starts with engaging a student's imagination. Doing so involves connecting the teaching with what students' care about and value. The metaphor or 'capturing' someone's imagination is commonly used to describe being compelled to think about something. Disengagement on the other hand occurs when the student's imagination resists being occupied by the topic of study. In simple terms, when imagination is captured students are thinking about the topic being discussed in such a way that they start to infer links to other pieces of information and to build models of the world. The resistance to be captivated or programmed by the teaching comes from previous experiences in their classrooms with teachers and peers. Students will develop their creative ability when they feel their classroom is a safe place to share what they know and can do. The

task of the teacher as audience and gatekeeper is to create a safe place for the development and expression of creative thinking.

Actor

Identity is an important element of engagement and creative development. This involves students having a strong sense of individuality and opportunities for participation while still being able to connect with the audience (teachers in this case). This message is echoed by research showing that supporting student autonomy is more effective than punishment when seeking to engage students (Elffers,2011; Fredricks et al., 2004; Morrison & Allen, 2007; Walker, 2019). Engaging students with tasks that fit their learning profile increases not only the likelihood of their engagement but also the likelihood of students developing positive identities as learners within their classroom cultures.

Some students take on the norms of their classroom more easily than others. Galang (2010) argued that creative people may be less trainable and less able to be socialised due to their making alternative/abnormal associations with moral and social norms because of low latent inhibition (LI) (as discussed above). LI has been associated with impulsivity, attentional deficits, novelty seeking, and distracted behaviours such as general inattentiveness, absent-mindedness, or switching subjects without warning in conversation (Galang, 2010; Prabhakaran et al., 2013). Importantly, Tsakanikos and Reed (2003) suggest that impulsivity is unrelated to intelligence and has both functional and dysfunctional facets. Many of the disengaged students in the current study reported being impulsive. Although impulsivity can be useful in some situations, impulsive students attract more negative attention from teachers; such negative interactions impede a student's capacity to concentrate, to manage their learning, and to adapt to novel tasks (Archambault & Dupéré, 2017). For those students with low latent inhibition and low sequential thinking actions, the norms of formal classroom

cultures might feel like they are visiting a foreign land. Recognition and acceptance of such differences is crucial in safe and supportive classroom cultures that foster engagement and creative development through positive identity formation.

Identity is a crucial element of engagement at school. The Classroom Disengaged students occupying a space within the mainstream school but outside of a regular classroom projects an identity typified by a negative difference. Classroom Disengaged students are characterised by their school as outsiders, constructed as abnormal, and seen as a problem to fix (Best & Kellner, 1991). It is concerning that teachers tend to form positive relationships with students who appear to try in class, while the misbehaving student becomes more alienated in response to constant sanctioning by teachers. Such alienation is detrimental to the disengaged student's enthusiasm, motivation for classroom learning and creative ability (Finn, 1989; Junod et al., 2006). This exposes the disengaged student to risk factors such as poor teacher-student relationships, low self-efficacy, and non-completion of work. A more integrated approach which explicitly offers opportunities for meaningful academic and personal development would support disengaged students' progress through their educational endeavours.

Actions

Students in this study viewed 'creativity' as something that they 'do'. Within a formal classroom culture, creative practice is understood as a cultural practice situated within a cultural context. Importantly, if creativity is to be developed, it is crucial to remember that formal literacy events require an understanding of 'the particular ways of thinking about and doing reading and writing in cultural contexts' (Street & Martin-Jones, 2000 p.22). The current study found that when this cultural context privileges text-based artefacts and affordances, a

basic level of competency in Sequential Thinking actions becomes a requirement for engagement and achievement.

Inferential thinking actions indicated creative engagement with the information, which in turn led to creative expression; however, this was only the case if the student had sufficient competency in Sequential Thinking actions. The previous point was most obvious with the high ability students. The implication of this is that even though they show high levels of Fluid and Crystallised Thinking actions, some high ability students may struggle at school because of their limited capacity to perform Sequential Thinking actions. Identifying which types of thinking actions are privileged in the classroom culture is the first step. The next step is to consider the affordances, symbolic and material, offered in the classroom and how these can be adapted to offer increased opportunities for action.

Affordances

Affordances as *opportunities for action* (Gibson, 1977) are perceived through the physical and communicative actions of the teacher but also through the artefacts available for learning. Students recognise the teacher as 'Gatekeeper', as the Audience who evaulates their work. This is in line with the formal role of the teacher, to validate and support the creative engagement of a student through the types of affordances given as dictated by the curriculum (ACARA, 2012). When considering how to engage disengaged high ability students, a focus on the student's perception of affordances is recommended. It follows from the discussion above that not all students perceive the same affordances even though they are in the same space; it is the *same space but not the same place*.

Students who have difficulties with oral and written language are less likely to achieve at secondary school (Swain, 2017). Verbal cues offering affordances are less likely to be understood by students with low Sequential Thinking capacity. In the present study,

disengaged students were more likely to express their creativity informally. This could be due to the open-ended nature of these informal domains and the openness of affordances offered. VanTassel-Baska (2018) highlights the importance of open-ended real-world tasks that require ideational fluency and flexibility to engage students of all ability levels. Providing students with an array of materials and opportunities to discuss their development will help student create spaces for their personal growth.

Artefacts

The engaged students desired further enculturation into what they saw as 'creative culture' by suggesting they would benefit from sharing their artefacts with others and by visiting galleries and museums to see other creative artefacts. They seemed to value instituitional domains of creativity and were inclined to replicate aspects of this culture. The artefacts defined as 'useful' and/or 'valued learning' in the curriculum are passed on to subsequent generations (Seddon, 2001). The engaged students happily inherit the curriculum and the domains of expression offered in schools. Engagement within a domain requires a minimal level of proficiency in certain patterns of action in response to the affordances of the artefacts. Think for example of an art historian's child at an art gallery as opposed to a child from a working-class background who has only visited the gallery once. Consider how these students would perceive the artefacts differently and how this might affect their comprehension of meaning in the artwork. This analogy also works for the classroom: students see the space with variation and their perception of artefacts is mediated by how they relate to the object but also the socio-cultural context in which the object is found.

With all cultural objects there are cultural elements which need to be 'seen' or perceived for engagement to occur. In more basic terms, the use of certain artefacts found in a classroom, such as a pen or a protractor, can lead to a student being excluded.

7.1.2 Implications for Wellbeing

In formal educational cultures, it is asserted that the teacher is the audience, the students are actors, and to be deemed engaged, the latter act in accordance with the expectations of the former. The formal 'audience' or gatekeeper in the classroom manages interactions and transactions between students (actors) and Artefacts by offering opportunities (Affordances) for knowledge expression through their own actions. A classroom culture emerges as a manifestation of the teacher's decisions around pedagogy and curriculum and these decisions have serious implications for their students' engagement and wellbeing.

The quality of this actor-audience relationship matters. Positive teacher-student relationships can improve student experiences and lead to both engagement and positive educational outcomes (Anderson et al., 2004). Being an engaged student means that learning at school is an enjoyable and rewarding experience characterised by positive relations with the audience. Even though disengagement is on a spectrum, school is a very different experience for disengaged students. The implications for wellbeing are framed through two dimensions of the Five A's: Audience and Affordances.

7.1.2.1 Audience and Relationship Building

Relationships with teachers matter as they provide feedback and encouragement to students (Goss et al.,2017). Feeling unsupported by teachers can have a detrimental effect on students' wellbeing (Morrison & Allen, 2007; Roorda et al., 2011; Roorda et al., 2017). Students can often be routinely ignored or dealing with them indefinitely deferred (Allan et al., 2005; Lee & Zimmerman, 1999). Highly creative students, unfortunately, can be seen as a problem for many teachers (Kim, 2008, Kim & VanTassel-Baska, 2010). The Classroom Disengaged group reported feeling unsupported, with low connectedness to school. this

importance of forming a positive connection to school also emerged in Subotnik et al.'s (2011) review of literature on high ability studies:

> 'high-ability or high-achieving students from low-income or ethnically and racially marginalized backgrounds may experience psychosocial stress reconciling their social identity with their academic or achievement identities. This may have the effect of decreasing their sense of belonging in and willingness to participate in gifted programs or advanced classes' (p.22).

The disengaged students in the current study also perceived a mismatch between themselves, their audience, and the tasks of the classroom.

While School Disengaged students might appear to be the most disengaged, they were engaged in their alternative settings where they felt both connected to school and able to be creative. More generally, the students participating in this study mentioned their desire to connect with teachers (as people) through less demeaning and/or aggressive interactions. Having more approachable teachers was a common theme confirming current research which shows that warm and supportive teachers positively influence engagement, effort, perseverance, and achievement (Amabile et al., 1999; Shah & Ali, 2012). Furthermore, teachers' reported support for creativity does not always result in creative classroom practice (Aljughaiman & Reynolds, 2005). This points to the importance of reflective practice to uncover and explore blind spots when planning and teaching.

7.1.2.2 Affordances and Behaviour Management

Behaviour management plays a vital role for engagement and wellbeing since disruptive behaviours can cause further problems depending on how the teacher responds to transgressions (Brouwers & Tomic (2000). Behaviour management functions as a mechanism for legitimising appropriate actions and artefacts by evaluating knowledge transactions and interactions. The classroom culture is experienced through these interactions and transactions.

Behaviour management is made easier when students can manage their own behaviour. Apart from teaching the cultural knowledge associated with academic subjects, social and emotional learning is critical for positive behaviour management (Cahill et al., 2014). Personal and social capability are priority goals in the Australian Curriculum (ACARA, 2012). Further to this, both the Melbourne Declaration on Educational Goals for Young Australians (MCEETYA, 2008) and the Alice Springs (Mparntwe) Education Declaration (2019) declare personal and social capabilities to be crucial for success in life. Social and emotional learning is thus crucial as it provides opportunities for students to improve their self-regulation and collaborative skills. Giving students opportunities to practise by providing opportunities to show knowledge is an important element of inclusive classrooms (Jones, 2013). The conclusions above propose managing student behaviour by creating a rich ecology for learning that includes a diverse set of artefacts and affordances but also safe and supportive audience relations. The easier it is for a student to access and engage with a task the less likely they are to avoid the task.

While a great deal of money can be spent on facilities to provide a diverse range of material affordances, the likelihood of students perceiving the material world as affording action is co-determined by the symbolic affordances offered by the culture. These symbolic

affordances are key to engaging students. Being with other disengaged students will feel familiar as the cultural patterns of behaviour in that classroom would be similar across the group with no student feeling like an outsider. Well-meaning re-engagement programs that isolate disengaged students risk further alienating these students by undermining their self-image (Smyth & Hattam, 2004).

Passive approaches to disengagement are highly problematic. Characterised by pastoral care but with deficit thinking; inadequacies in time allocation, the skills and structure of staff, and school commitment make this approach ineffective. The passive approach struggles to adapt to the changing nature of young people or to recognise the need to modify the actions and attitudes of the school culture (Smyth & Hattam, 2004). Passive and aggressive approaches to disengaged students often lead to the same outcome: early school leaving. Smyth and Hattam (2004) argue that passive schools risk misteaching and mis-managing learning processes. In an aggressive approach, teachers are condescending and demand compliance; troublemakers are removed, and students' own sense of justice is not recognised (Smyth & Hattam, 2004). A common theme from the disengaged students indicated similar experiences.

The Classroom Disengaged students had a broken connection to school and were streamed based on their level of behavioural engagement rather than their ability. This finding builds on previous research from Dishion et al. (1999) which showed that 'streaming' style interventions can communicate implicit messages saying that 'there is something wrong with you', and lead to higher risk behaviours becoming the norm and being rewarded by peers. Dishion et al. (1999) conclude that 'these programs can inadvertently reinforce problem behavior' (p.755).

How disengaged students are characterised within their school matters. The definition of engagement provided above, offers a way forward when considering how and where disengaged students fit into schools. Smyth and Hattam (2004) characterise this approach as Active: an actively inclusive school culture creates opportunities for students to be listened to and there is a general atmosphere of trust. Further, student voice, agency, and independence are prioritised. Curriculum is negotiated around students' lives and interests, with a socially critical element (Smyth & Hattam, 2004). For the School Disengaged students, this seems to be their experience outside a mainstream setting. The challenge is adopting these aspects in a mainstream school.

Creative actions manifest in multiple ways, and the more a school recognises this the more likely they will be to engage alienated students. In attempting to engage or re-engage students who have become alienated from regular classrooms, focusing only on personal traits or characteristics in isolation will bring limited results. Such a focus underestimates the impact on the student from years of disengagement within their classroom cultures.

7.2 Limitations of the Present Study

Throughout the data collection process, consideration was given to strategies for keeping the students engaged with the research process. This was even more important when considering how to work with disengaged students. The study was framed as an opportunity for student voice to be heard, and as an opportunity to help future students by contributing to academic knowledge. Given the strategies used to connect with the students, it is assumed that participants completed the tasks authentically. An addition to future studies could be a request for students to complete an anonymous reflection on how it felt to be a part of the study.

Sample size and location may be perceived as a limitation of this study. While the sample size provided a rich dataset to infer new knowledge about disengaged students, including more students would have increased the descriptive and explanatory power as well as the statistical significance of the findings. The choice was made at the planning stages of the study to investigate a smaller group of students, around 150, but with depth. Collecting data from a larger group of participants was considered. However, it was deemed problematic due to logistical issues and the risk of burying the participant's voice in large amounts of quantitative data. This project sought to articulate the participant's perspective as well as how they perform on an array of tasks. This is not a prevalence study, so it cannot be generalised to disengaged students all over the world.

Constraining these variables by focusing on expressions of creativity in a formal classroom culture led to developing a framework of engagement. The tasks used in this study can help teachers identify the learning capacity of disengaged students. In the development of this framework, conceptions of engagement were critically analysed to reframe high ability disengaged students so that they are understood as learners. This thesis is situated within a cultural context and makes sense of the phenomena according to this culture. Glăveanu (2013) states

> 'the five A's framework is not intended to offer definitive answers about the nature of creativity because, just like the four P's model, it does not specify any exact relations between actors, actions, artifacts, audiences, and affordances. These are meant to be discovered in research, not postulated in advance. At the same time, more than the four P's, this framework is capable of guiding research and suggesting new questions about creativity that were

previously ignored or unnoticed' (p.78).

The current study has used the Five A's to guide an investigation into how students perceive their classroom culture and their ability to interact and transact within these cultures. This research has enabled students to describe their view school and the ways in which they might interact and transact within their classroom culture. The values of this project, promoting wellbeing, creativity, and student agency, stem from Victorian government policy directions as discussed in section 1.2.1.

7.3 Suggestions for Further Research

Understanding teacher perspectives. The current study focused on the perceptions of students given the extensive extant research from teachers' perspectives (Aljughaiman & Reynolds, 2005; Chan & Chan, 1999; Furman, 1998; Karwowski, 2010; Karwowski et al., 2020). It would be worthwhile observing engaged and disengaged students for long periods of time in their classroom culture as they interact with their teachers and peers. A longitudinal study would enrich the development of the framework.

Further research focusing on peers as audience. Haslam et al. (2013) have undertaking important work in this area. While peers play a significant role in the process of creativity, the focus of the current study was to understand students' perceptions of formal institutional factors, such as the teacher, but also to examine their relationship with the formal classroom culture. Using the Five A's framework to research this area would provide further insights into how power dynamics affect peer relations in terms of expressing creativity inside and outside their classroom. The current study operationalises the Five A's framework to explore and describe students' perceptions of socio-cultural interactions and transactions found in Victorian schools. Further research into might consider other permutations of the

relationships between the different dimensions. Once such project could flip the audience with the student evaluating their teacher's tasks.

7.4 Concluding remarks

Creativity is seen as something to be nurtured and promoted in educational discourse around the world. The approach taken in this thesis moves away from individualistic conceptions of ability and engagement. The rationale for this rests on the critique of narrow and exclusionary methods of identifying high ability students and the important of teacher-student relationships. Instead, the focus has been on the student as part of a culture that determines affordances, artefact, and actions. Considerations of how these dimensions relate to the student and their actions has provided useful insights crucial for understanding of the dis/engagement and creativity.

Students' perceptions of the affordances and artefacts in their classroom, and the thinking actions they are able to perform, lead to patterns of action that are deemed in/appropriate by their audience. It has been argued that student disengagement from a classroom culture occurs when a student is unable to reproduce patterns of action expected within their classroom culture. A disengaged student has not internalised the actions and actor attributes deemed appropriate by the audience. In other words, their learning profile mismatches the material and symbolic affordances defined by the culture of their classroom. This mismatch between the expectation of their classroom culture alienates these students. They ultimately seek other places to develop and express their creativity.

References

ACARA. (2012). Australian National Curriculum. *http://www.australiancurriculum.edu.au/*.

Acar, S., Acar, M., & Runco. (2014). Assessing Associative Distance Among Ideas Elicited by Tests of Divergent Thinking. *Creativity Research Journal, 26*(2), 229-238.

Adarves-Yorno, I., Postmes, T., & Haslam, A. S. (2006). Social identity and the recognition of creativity in groups. *British Journal of Social Psychology, 45*(3), 479-497.

Adnan, A., Lam, J., Turner, G. R., Beaty, R., & Spreng, R. N. (2019). Intrinsic default—executive coupling of the creative aging brain. *Social cognitive and affective neuroscience, 14*(3), 291-303. doi:10.1093/scan/nsz013 %J Social Cognitive and Affective Neuroscience

Addison, N., Burgess, L., Steers, J., & Trowell, J. (2010). *Understanding art education: Engaging reflexively with practice*: Routledge.

Aguilar-Alonso, A. (1996). Personality and creativity. *Personality and Individual Differences, 21*(6), 959-969. http://dx.doi.org/10.1016/S0191-8869(96)00162-6

Ainsworth, M. S. (1979). Infant–mother attachment. *American psychologist*, *34*(10), 932.

Albert, R. S. (1993, May). The contribution of early family history to the achievement of eminence. In development*: Proceedings from the* (pp. 311-360). Alexander, K. L., Entwisle, D. R., & Dauber, S. L. J. C. d. (1993). First-grade classroom behavior: Its short-and long-term consequences for school performance. *64*(3), 801-814.

Alexander, K. L., Entwisle, D. R., & Horsey, C. S. (1997). From first grade forward: Early foundations of high school dropout. 87-107.

Amabile, T., Burnside, R. M., & Gryskiewicz, S. S. (1999). *User's manual for KEYS, assessing the climate for creativity: A survey from the Center for Creative Leadership*: Center for Creative Leadership.

Amabile, T. M., (1995), (Commentary) Attributions of Creativity: What Are the Consequences? Creativity Research Journal, Vol 8, No: 4.

Amabile, T. M. (1983). *The social psychology of creativity* (Vol. 11): Springer-Verlag New York.

Amabile, T. M. (1985). Motivation and Creativity: Effects of Motivational Orientation on Creative Writers. *Journal of Personality and Social Psychology Vol. 48.* (No. 2), 393-399.

Amabile, T. M. (1996). *Creativity in context: Update to' the social psychology of creativity.'*: Westview Press.

Amabile, T. M. (2017). In Pursuit of Everyday Creativity. *The Journal of Creative Behavior*(4), 335. doi:10.1002/jocb.200

Amabile, T. M., & Pillemer, J. (2012). Perspectives on the social psychology of creativity. *The Journal of Creative Behavior, 46*(1), 3-15.

Ambrose, D., Cohen, L. M., & Tannenbaum, A. J. (2003). *Creative intelligence: Toward theoretical integration*: Hampton Press (NJ).

Anastasi, A. (1982). Psychological testing. *New York: MacMillan.*

Anderson, A. R., Christenson, S. L., Sinclair, M. F., & Lehr, C. A. (2004). Check & Connect: The importance of relationships for promoting engagement with school. *Journal of School Psychology*, *42*(2), 95-113.

Apple, M. W., & Beane, J. A. (1999). *Democratic schools: Lessons from the chalk face*: Open University Press.

Appleton, J. J., Christenson, S. L., Kim, D., & Reschly, A. L. (2006). Measuring cognitive and psychological engagement: Validation of the Student Engagement Instrument. *Journal of school psychology*, *44*(5), 427-445.

Arbuckle, C., & Little, E. (2004). Teachers' Perceptions and Management of Disruptive

Classroom Behaviour during the Middle Years (Years Five to Nine). *Australian Journal of Educational & Developmental Psychology, 4*, 59-70.

Archambault, I. & Dupéré, V. (2017). 'Joint trajectories of behavioral, affective, and cognitive engagement in elementary school.' *The Journal of Educational Research* 110(2): 188-198.

Archambault, I., Janosz, M., Fallu, J., & Pagani, L. S. (2009a). 'Student engagement and its relationship with early high school dropout.' *Journal of Adolescence* 32(3): 651-670.

Archambault, I., Janosz, M., Fallu, J., Pagani, L. S., (2009b). 'Adolescent behavioral, affective, and cognitive engagement in school: Relationship to dropout.' 79(9): 408-415.

Armbruster, B. B. (1989). Metacognition in creativity. In *Handbook of creativity* (pp. 177-182): Springer. focus, and regulatory closure. *Journal of personality and Social Psychology, 100*(5), 794.

Baars, B. J. (1993). *A cognitive theory of consciousness*. Cambridge University Press.

Baer, J. (1994). Why You Shouldn't Trust Creativity Tests. *Educational Leadership, 51*(4), 80-83.

Baer, J. (1998). The case for domain specificity of creativity. *Creativity Research Journal, 11*(2), 173-177.

Baer, J. (2010). Is creativity domain specific. *The Cambridge handbook of creativity*, *321*.

Baer, J. (2011). How divergent thinking tests mislead us: Are the Torrance Tests still relevant in the 21st century? The Division 10 debate. *Psychology of Aesthetics, Creativity, and the Arts, 5*(4), 309.

Baer, J., & Kaufman, J. C. (2008). Gender differences in creativity. *The Journal of Creative Behavior, 42*(2), 75-105.

Baer, J., & Kaufman, J. C. (2012). *Being Creative Inside and Outside the Classroom: How to*

Boost Your Students' Creativity--and Your Own (Vol. 2): Springer.

Bandura, A. (1989). Human agency in social cognitive theory. *American psychologist, 44*(9), 1175.

Bandura, A. (1997). *Self-efficacy: The exercise of control*: Macmillan.

Barab, S. A., & Plucker, J. A. (2002). Smart people or smart contexts? Cognition, ability, and development in an age of situated approaches to knowing and learning. *37*(3), 165-182.

Barbot, B., Besançon, M., & Lubart, T. (2015). Creative potential in educational settings: its nature, measure, and nurture. *Education 3-13, 43*(4), 371-381.

Barbot, B., Besançon, M., & Lubart, T. I. (2011). Assessing creativity in the classroom. *The Open Education Journal, 4*(58-66).

Barbot, B., Haeffel, G. J., Macomber, D., Hart, L., Chapman, J., & Grigorenko, E. L. (2012). Development and validation of the Delinquency Reduction Outcome Profile (DROP) in a sample of incarcerated juveniles: A multiconstruct/multisituational scoring approach. *Psychological assessment, 24*(4), 901.

Barbot, B., Lubart, T. I., & Besançon, M. (2016). 'Peaks, Slumps, and Bumps': Individual Differences in the Development of Creativity in Children and Adolescents. *New Directions for Child and Adolescent Development, 2016*(151), 33-45. doi:10.1002/cad.20152

Barr, A., Gillard, J., Firth, V., Scrymgour, M., Welford, R., Lomax-Smith, J., Constable, E. (2008). *Melbourne Declaration on Educational Goals for Young Australians*: ERIC.

Baldwin, A. (2010). Creativity: A look outside the box in classrooms. *Nurturing creativity in the classroom*, 73-87.

Barrett, T. C. (1968). Taxonomy of cognitive and affective dimensions of reading comprehension. *Theodore Clymer,'What is reading*.

Barrett, L. F., & Satpute, A. B. (2013). Large-scale brain networks in affective and social neuroscience: towards an integrative functional architecture of the brain. *Current opinion in neurobiology*.

Barron, F., & Harrington, D. M. (1981). Creativity, intelligence, and personality. *Annual review of psychology*, *32*(1), 439-476.

Batey, M. (2012). The measurement of creativity: From definitional consensus to the introduction of a new heuristic framework. *Creativity Research Journal, 24*(1), 55-65.

Batey, M., & Furnham, A. (2006). Creativity, intelligence, and personality: A critical review of the scattered literature. *Genetic, Social, and General Psychology Monographs, 132*(4), 355-429.

Batey, M., & Furnham, A. (2008). The relationship between measures of creativity and schizotypy. *Personality and Individual Differences, 45*(8), 816-821.

Batey, M., Furnham, A., & Safiullina, X. (2010). Intelligence, general knowledge and personality as predictors of creativity. *Learning and Individual Differences, 20*(5), 532-535.

Baum, S. M., Renzulli, J. S., & Hébert, T. P. (1995). Reversing underachievement: Creative productivity as a systematic intervention. *Gifted Child Quarterly*.

Beaman, R., Wheldall, K., & Kemp, C. (2007). Recent research on troublesome classroom behaviour: A review. *Australasian Journal of Special Education*, *31*(1), 45-60.

Beghetto, R. A. (2006). Creative self-efficacy: Correlates in middle and secondary students. *Creativity Research Journal, 18*(4), 447-457. doi:10.1207/s15326934crj1804_4

Beghetto, R. A. (2010). Creativity in the classroom. *The Cambridge handbook of creativity*,

447-463.

Beghetto, R. A. (2013). *Killing ideas softly?: The promise and perils of creativity in the classroom*: IAP.

Beghetto, R. A. (2016). *Big wins, small steps: How to lead for and with creativity*: Corwin Press.

Beghetto, R. A., & Dilley, A. E. (2016). Creative Aspirations or Pipe Dreams? Toward Understanding Creative Mortification in Children and Adolescents. *New Directions for Child and Adolescent Development, 2016*(151), 85-95. doi:10.1002/cad.20150

Beghetto, R. A., & Kaufman, J. C. (2007). The genesis of creative greatness: mini-c and the expert performance approach. *High Ability Studies, 18*(1), 59-61.

Beghetto, R. A., & Kaufman, J. C. (2010). *Nurturing creativity in the classroom*: Cambridge University Press.

Beghetto, R. A., & Kaufman, J. C. (2014). Classroom contexts for creativity. *High Ability Studies*, 1-17. doi:10.1080/13598139.2014.905247

Beghetto, R. A., & Schreiber, J. B. (2017). Creativity in doubt: Toward understanding what drives creativity in learning. In *Creativity and Giftedness* (pp. 147-162): Springer.

Belsky, J., Bakermans-Kranenburg, M. J., & Van IJzendoorn, M. H. (2007). For better and for worse differential susceptibility to environmental influences. *Current Directions in Psychological Science, 16*(6), 300-304.

Belsky, J., & Pluess, M. (2009). The nature (and nurture?) of plasticity in early human development. *Perspectives on Psychological Science, 4*(4), 345-351.

Benbow, C. P., & Minor, L. L. (1990). Cognitive profiles of verbally and mathematically precocious students: Implications for identification of the gifted. *Gifted Child Quarterly, 34*(1), 21-26.

Benbow, C. P., & Minor, L. L. (1990). Cognitive profiles of verbally and mathematically

precocious students: Implications for identification of the gifted. *34*(1), 21-26.

Benbow, C. P., Stanley, J. C., Kirk, M. K., & Zonderman, A. B. J. I. (1983). Structure of intelligence in intellectually precocious children and in their parents. *7*(2), 129-152.

Benedek, M., Franz, F., Heene, M., & Neubauer, A. C. (2012). Differential effects of cognitive inhibition and intelligence on creativity. *Personality and Individual Differences, 53*(4), 480-485.

Benedek, M., Jauk, E., Fink, A., Koschutnig, K., Reishofer, G., Ebner, F., & Neubauer, A. C. (2014). To create or to recall? Neural mechanisms underlying the generation of creative new ideas. *NeuroImage, 88*(0), 125-133. http://dx.doi.org/10.1016/j.neuroimage.2013.11.021

Benedek, M., Jauk, E., Sommer, M., Arendasy, M., & Neubauer, A. C. (2014). Intelligence, creativity, and cognitive control: The common and differential involvement of executive functions in intelligence and creativity. *Intelligence, 46*(0), 73-83. http://dx.doi.org/10.1016/j.intell.2014.05.007

Benedek, M., Schickel, R. J., Jauk, E., Fink, A., & Neubauer, A. C. (2014). Alpha power increases in right parietal cortex reflects focused internal attention. *Neuropsychologia, 56*, 393-400.

Best, S., & Kellner, D. (1991). *Postmodern theory: Critical interrogations*: Guilford Press.

Betts, G. T., & Neihart, M. . (1988). Profiles of the gifted and Talented. *Gifted Child Quarterly, Vol. 1* (32(2), 248-253.), p. 97.

Bishop, D. V., & Adams, C. J. (1990). A prospective study of the relationship between specific language impairment, phonological disorders and reading retardation. *31*(7), 1027-1050.

Bishop, D. V., & McDonald, D. J. (2009). Identifying language impairment in children:

combining language test scores with parental report. *44*(5), 600-615.

Black, A. E., & Deci, E. L. (2000). The effects of instructors' autonomy support and students' autonomous motivation on learning organic chemistry: A self-determination theory perspective. *Science education, 84*(6), 740-756.

Blank, M., Rose, S. A., & Berlin, L. J. (1978). *The language of learning: The preschool years*: Grune & Stratton.

Boden, M. (1990). The Creative Mind: Myths and Mechanisms Weidenfield and Nicolson. *London, UK*.

Bourdieu, P. (1983). Economic capital, cultural capital, social capital. *Soziale-Welt, Supplement, 2*, 183-198.

Bourdieu, P. (1986). The forms of capital Handbook of theory and research for the sociology of education (pp. 241–258). *R.(1974). The Power Broker: Robert Moses and the Fall of New York*.

Boon, H. J., & Lewthwaite, B. E. (2016). Teacher ethics: the link between quality teaching and multi-ethnic and multiracial education. *Athens Journal of Education, 3*, 331-344.

Borland, J. H. (2005). Gifted education without gifted children. *Conceptions of giftedness*, 1-19.

Bowlby, J. (1973). Attachment and loss: Volume II: Separation, anxiety and anger. In *Attachment and Loss: Volume II: Separation, Anxiety and Anger* (pp. 1-429). London: The Hogarth Press and the Institute of Psycho-Analysis.

Boyatzis, R. E. (1998). *Transforming qualitative information: Thematic analysis and code development*: sage.

Bradshaw, C. P., O'Brennan, L. M., & McNeely, C. A. (2008). Core competencies and the prevention of school failure and early school leaving. *New directions for child and*

adolescent Development, *2008*(122), 19-32.

Bressler, S. L., & Menon, V. (2010). Large-scale brain networks in cognition: emerging methods and principles. *Trends in cognitive sciences, 14*(6), 277-290.

Brinthaupt, T. M., Smartt, D. D., & Long, K. (2019). Schizotypal Tendencies Are Positively Associated With Self-Talk Frequency. 0033294119868808.

Brouwers, A., & Tomic, W. (2000). A longitudinal study of teacher burnout and perceived self-efficacy in classroom management. *Teaching and Teacher education, 16*(2), 239-253.

Bruner, J. S. (1975). From communication to language—A psychological perspective. *Cognition, 3*(3), 255-287.

Bruning, R. H., Norby, M. M., & Schraw, G. J. (2011). *Cognitive psychology and instruction / Roger H. Bruning, Gregory J. Schraw, Monica M. Norby*: Boston, Mass. : Pearson, c2011.

Bronfenbrenner, U. (1992). *Ecological systems theory*. Jessica Kingsley Publishers.

Bronfenbrenner, U., & Morris, P. A. (2006). The bioecological model of human development. *Handbook of child psychology*.

Buckner, R. L., Andrews-Hanna, J. R., & Schacter, D. L. (2008). The Brain's Default Network. *Annals of the New York Academy of Sciences, 1124*(1), 1-38.

Buhs, E. S., Ladd, G. W., & Herald, S. (2006). Peer exclusion and victimization: Processes that mediate the relation between peer group rejection and children's classroom engagement and achievement? *, 98*(1), 1.

Burch, G. S., Hemsley, D. R., Pavelis, C., & Corr, P. J. (2006). Personality, creativity and latent inhibition. *European Journal of Personality, 20*(2), 107-122.

Cahill, H., Beadle, S., Farrelly, A., Forster, R., & Smith, K. (2014). Building resilience in children and young people. *The University of Melbourne*.

Carroll, J. B. (1997). Psychometrics, intelligence, and public perception. *Intelligence*, *24*(1), 25-52.

Caraisco, J. (2007). Overcoming lethargy in gifted and Talented education with contract activity packages' i'm choosing to learn!'. *The Clearing House: A Journal of Educational Strategies, Issues and Ideas, 80*(6), 255-260.

Catalano, R. F., Oesterle, S., Fleming, C. B., & Hawkins, J. D. (2004). The importance of bonding to school for healthy development: Findings from the Social Development Research Group. *Journal of School Health, 74*(7), 252-261.

Cattell, R. B. (1987). *Intelligence: Its structure, growth and action*: Elsevier.

Catts, H. W. (1993). The relationship between speech-language impairments and reading disabilities. *Journal of Speech, Language, and Hearing Research*, *36*(5), 948-958.

Chan, D. W., & Chan, L. (1999). Implicit theories of creativity: Teachers' perception of student characteristics in Hong Kong. *Creativity Research Journal, 12*(3), 185-195.

Cho, S. H., Nijenhuis, J. T., Vianen, A. E., Kim, H. B., & Lee, K. H. (2010). The relationship between diverse components of intelligence and creativity. *The Journal of Creative Behavior, 44*(2), 125-137.

Chong, W. H., Liem, G. A., Huan, V. S., Kit, P. L., & Ang, R. P. (2018). Student perceptions of self-efficacy and teacher support for learning in fostering youth competencies: Roles of affective and cognitive engagement. In (Vol. 68, pp. 1-11).

Christoff, K., Gordon, A. M., Smallwood, J., Smith, R., & Schooler, J. W. (2009). Experience sampling during fMRI reveals default network and executive system contributions to mind wandering. *Proceedings of the National Academy of Sciences, 106*(21), 8719-8724.

Cohen, L. (2003). A conceptual lens for looking at theories of creativity. *Creative intelligence: toward theoretic integration*, 33-77.

Colangelo, N., & Dettmann, D. F. (1983). A conceptual model of four types of parent-school interactions. *Journal for the Education of the Gifted*, *5*(2), 120-126.

Cole, M. (1996). 1 996 Cultural Psychology. Carnbridge, Mass.: Harvard University Press.

Collard, P., & Looney, J. (2014). Nurturing Creativity in Education. *European Journal of Education*, n/a-n/a. doi:10.1111/ejed.12090

Connell, J. P., & Wellborn, J. G. (1991). Competence, autonomy, and relatedness: A motivational analysis of self-system processes.

Conti-Ramsden, G., & Durkin, K. J. (2012). Language development and assessment in the preschool period. *22*(4), 384-401.

Conti-Ramsden, G., St Clair, M. C., Pickles, A., & Durkin, K. (2012). Developmental trajectories of verbal and nonverbal skills in individuals with a history of specific language impairment: From childhood to adolescence.

Cook-Sather, A. (2002). Authorizing students' perspectives: Toward trust, dialogue, and change in education. *Educational researcher, 31*(4), 3-14.

Cramond, B., Kim, K. H., & VanTassel-Baska, J. (2010). The relationship between creativity and intelligence.

Crone, E. A., Wendelken, C., van Leijenhorst, L., Honomichl, R. D., Christoff, K., & Bunge, S. A. (2009). Neurocognitive development of relational reasoning. *Developmental science, 12*(1), 55-66.

Cropley, A. J. (1994). Creative intelligence: A concept of true'giftedness. *European Journal for High Ability, 5*(1), 6-23.

Cropley, A. (2006). In praise of convergent thinking. *Creativity Research Journal, 18*(3), 391-404.

Csikszentmihalyi, M. (1998). Creativity and genius: A systems perspective. *Genius and the mind: Studies of creativity and temperament*, 39-64.

Csikszentmihályi, M. (1990). The domain of creativity. In M. A. Runco & R. S. Albert (Eds.), *Theories of creativity.* (pp. 190-212). Thousand Oaks, CA, US: Sage Publications, Inc.

D'Argembeau, A., Stawarczyk, D., Majerus, S., Collette, F., Van der Linden, M., Feyers, D. & Salmon, E. (2010). The neural basis of personal goal processing when envisioning future events. *Journal of cognitive neuroscience*, *22*(8), 1701-1713.

Daniels, S., & Piechowski. (2009). *Living with Intensity: Understanding the Sensitivity, Excitability, and the Emotional Development of Gifted Children, Adolescents, and Adults*: Great Potential Press, Inc.

Das, J. P. (1992). Beyond a unidimensional scale of merit. *Intelligence*, *16*(2), 137-149.

Das, J. P. (2002). A better look at intelligence. *Current directions in psychological science*, *11*(1), 28-33.

Davis, G. A. (1999). Barriers to creativity and creative attitudes. *Encyclopedia of creativity, 1*, 165-174.

Dawes, J. G. (2012). Do data characteristics change according to the number of scale points used? An experiment using 5 point, 7 point and 10 point scales.

de Bruin, L. R., & Harris, A. (2018). Fostering creative ecologies in Australasian secondary schools. *Australian Journal of Teacher Education (Online), 42*(9), 23.

DEECD. (2014). Aiming High: A strategy for gifted and Talented Students in Victoria. (Department of Education and Early childhood Development).

DeMoss, K., Milich, R., & DeMers, S. (1993). Gender, creativity, depression, and attributional style in adolescents with high academic ability. *Journal of Abnormal Child Psychology, 21*(4), 455-467.

Denzin, N. K. (1978). The research act: A theoretical introduction to research methods. *New Brunswick, NJ: Aldine Transaction*.

Denzin, N. K., & Lincoln, Y. S. (1995). Transforming qualitative research methods: Is it a revolution?. *Journal of Contemporary Ethnography*, *24*(3), 349-358.

Dewett, T., & Gruys, M. L. (2007). Advancing the case for creativity through graduate business education. *Thinking Skills and Creativity*, *2*(2), 85-95.

Dewey, J. (1963). *Experience and education*: Collier.

Dickman, S. J. (1993). *Impulsivity and information processing.* In W. G. McCown, J. L. Johnson, & M. B. Shure (Eds.), *The impulsive client: Theory, research, and treatment* (p. 151–184). American Psychological Association. https://doi.org/10.1037/10500-010

Dietrich, A. (2004). The cognitive neuroscience of creativity. *Psychonomic Bulletin & Review, 11*(6), 1011-1026.

Dietrich, A. (2007). Who's afraid of a cognitive neuroscience of creativity? *Methods, 42*(1), 22-27.

DiLiello, T. C., & Houghton, J. D. (2008). Creative potential and practised creativity: Identifying untapped creativity in organizations. *Creativity and Innovation Management, 17*(1), 37-46.

Dilley, J. A. (2009). *Research review: School-based health interventions and academic achievement*. Washington State Department of Health.

Dishion, T. J., McCord, J., & Poulin, F. J. A. p. (1999). When interventions harm: Peer groups and problem behavior. *54*(9), 755.

Dippo, C., & Kudrowitz, B. (2013). Evaluating the alternative uses test of creativity. *2013 NCUR*.

Dogra, N. (2004). Commissioning and delivering culturally diverse child and adolescent mental health services. *Current Opinion in Psychiatry*, *17*(4), 243-247.

Dunn, C., Chambers, D., & Rabren, K. (2004). Variables affecting students' decisions to drop out of school. *Remedial and special education*, *25*(5), 314-323.

Dweck, C. S. (2000). *Self-theories: Their role in motivation, personality, and development*: Psychology Press.

Education Council, (2019). Alice Springs (Mparntwe) Education Declaration. *Accessed online*, *12*, 3.6.2020: https://www.dese.gov.au/alice-springs-mparntwe-education-declaration/resources/alice-springs-mparntwe-education-declaration

Elffers, L. (2011). *The transition to post-secondary vocational education: students' entrance*. PhD Dissertation, University of Amsterdam, the Netherlands.

Emerick, J. (2004). Academic underachievement among the gifted: students' perceptions of factors that reverse the pattern. *Social/Emotional issues, underachievement and counseling of gifted and Talented students*, 102-110.

Emerick, L. J. (1992). Academic underachievement among the gifted: Students' perceptions of factors that reverse the pattern. *Gifted Child Quarterly, 36*(3), 140-146.

Ericsson, K. A., Nandagopal, K., & Roring, R. W. (2009). An expert performance approach to the study of giftedness. In *International handbook on giftedness* (pp. 129-153): Springer.

Espelage, D. L., Cauffman, E., Broidy, L., Piquero, A. R., Mazerolle, P., & Steiner, H. (2003). A cluster-analytic investigation of MMPI profiles of serious male and female juvenile

offenders. *Journal of the American Academy of Child & Adolescent Psychiatry*, *42*(7), 770-777.

Eyal, C., & Lindgren, H. C. (1977). The house-tree-person test as a measure of intelligence and creativity. *Perceptual and motor skills, 44*(2), 359-362.

Eysenck, H. J. (1997). Creativity and personality. *The creativity research handbook, 1*, 41-66.

Feder, E. K. (2011). Power/knowledge. *Michel Foucault: Key concepts*, 55-68.

Feist, G. J. (1998). A meta-analysis of personality in scientific and artistic creativity. *Personality and Social Psychology Review, 2*(4), 290-309.

Feldhusen, J. F. (1995). Creativity: A knowledge base, metacognitive skills, and personality factors. *The Journal of Creative Behavior, 29*(4), 255-268.

Ferrer, E., & McArdle, J. J. (2004). An experimental analysis of dynamic hypotheses about cognitive abilities and achievement from childhood to early adulthood. *Developmental psychology*, *40*(6), 935.

Ferrer, E., McArdle, J. J., Shaywitz, B. A., Holahan, J. M., Marchione, K., & Shaywitz, S. (2007). Longitudinal models of developmental dynamics between reading and cognition from childhood to adolescence. *43*(6), 1460.

Fielding, M. (2001). Students as radical agents of change. *Journal of educational change, 2*(2), 123-141.

Fink, A., Weber, B., Koschutnig, K., Benedek, M., Reishofer, G., Ebner, F., . . . Weiss, E. M. (2014). Creativity and schizotypy from the neuroscience perspective. *Cognitive, Affective, & Behavioral Neuroscience, 14*(1), 378-387.

Finn, J. D. (1989). Withdrawing from school. *Review of educational research*, *59*(2), 117-142.

Finn, J. D., & Cox, D. A. (1992). Participation and withdrawal among fourth-grade pupils. *29*(1), 141-162.

Finn, J. D., & Rock, D. A. (1997). Academic success among students at risk for school failure. *Journal of applied psychology, 82*(2), 221.

Finn, J. D., & Rock, D. A. (1997). Academic success among students at risk for school failure. *Journal of applied psychology, 82*(2), 221.

Flinn, M. V., Geary, D. C., & Ward, C. V. (2005). Ecological dominance, social competition, and coalitionary arms races: Why humans evolved extraordinary intelligence. *Evolution and Human Behavior, 26*(1), 10-46.

Ford, V. B., & Roby, D. E. (2013). Why Do High School Students Lack Motivation in the Classroom? *Global Education Journal, 2013*(2).

Ford, D. Y., Grantham, T. C., & Whiting, G. W. (2008). Culturally and linguistically diverse students in gifted education: Recruitment and retention issues. *Exceptional Children*, *74*(3), 289-306.

Forgeard, M. J., & Mecklenburg, A. C. (2013). The two dimensions of motivation and a reciprocal model of the creative process. *Review of General Psychology, 17*(3), 255.

Forgeard, M. J., & Elstein, J. G. (2014). Advancing the Clinical Science of Creativity. *Frontiers in psychology, 5*. doi:10.3389/fpsyg.2014.00613

Fox, M. D., Zhang, D., Snyder, A. Z., & Raichle, M. E. (2009). The global signal and observed anticorrelated resting state brain networks. *Journal of neurophysiology*, *101*(6), 3270-3283.

Franck, K., & Rosen, E. (1949). *Franck drawing completion test*: Australian Council for Educational Research.

Fredricks, J. A. (2014). *Eight myths of student disengagement: Creating classrooms of deep learning*. Corwin Press.

Fredricks, J., Alfeld, C., & Eccles, J. (2010). Developing and fostering passion in academic and nonacademic domains. Gifted Child Quarterly, 54(1), 18-30.

Fredricks, J., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence. *Review of educational research*, *74*(1), 59-109.

Fredricks, J., McColskey, W., Meli, J., Mordica, J., Montrosse, B., & Mooney, K. (2011). Measuring Student Engagement in Upper Elementary through High School: A Description of 21 Instruments. Issues & Answers. REL 2011-No. 098. *Regional Educational Laboratory Southeast*.

Furnham, A., & Bachtiar, V. (2008). Personality and intelligence as predictors of creativity. *Personality and Individual Differences, 45*(7), 613-617.

Furnham, A., Crump, J., Batey, M., & Chamorro-Premuzic, T. (2009). Personality and ability predictors of the 'Consequences' Test of divergent thinking in a large non-student sample. *Personality and Individual Differences, 46*(4), 536-540.

Furrer, C., & Skinner, E. (2003). Sense of relatedness as a factor in children's academic engagement and performance. *Journal of Educational Psychology, 95*(1), 148.

Fyfe, S., Williams, C., Mason, O. J., & Pickup, G. J. (2008). Apophenia, theory of mind and schizotypy: Perceiving meaning and intentionality in randomness. *Cortex, 44*(10), 1316-1325.

Gable, S. L., Reis, H. T., & Elliot, A. J. (2000). Behavioral activation and inhibition in everyday life. *Journal of personality and Social Psychology, 78*(6), 1135.

Gabora, L. (2003). Contextual focus: A tentative cognitive explanation for the cultural transition of the middle/upper Paleolithic. In *Proceedings of the 25th Annual Meeting of the Cognitive Science Society. Boston. MA: Lawrence Erlbaum Associates*.

Gabora, L. (2010). Revenge of the 'Neurds': Characterizing Creative Thought in Terms of the

Structure and Dynamics of Memory. *Creativity Research Journal, 22*(1), 1-13. doi:10.1080/10400410903579494

Gabora, L., & Kaufman, S. B. (2010). Evolutionary approaches to creativity. *The Cambridge handbook of creativity*, 279-300.

Gagné. (2004). Transforming gifts into s: the DMGT as a developmental theory. *High Ability Studies, 15*(2), 119-147.

Gagné, F. (1985). Giftedness and talent: Reexamining a reexamination of the definitions. *Gifted Child Quarterly, 29*(3), 103-112.

Gagné, F. (2010). Motivation within the DMGT 2.0 framework. *High Ability Studies, 21*(2), 81-99.

Gagné, F. (2013). The DMGT: Changes Within, Beneath, and Beyond. *Development & Excellence, 5*(1).

Gagné, F. (2013). YES, GIFTEDNESS (AKA 'INNATE') DOES EXIST! *The Complexity of Greatness: Beyond Or Practice*, 191.

Gagné, F., & Schader, R. M. (2005). Chance and Talent development. *Roeper Review, 28*(2), 88-90.

Gagné, F. (2004). Transforming gifts into Talents: The DMGT as a developmental theory. *15*(2), 119-147.

Gagné, F. (2013). The DMGT: Changes within, beneath, and beyond. *5*(1), 5-19.

Gajda, A. (2016). 'The relationship between school achievement and creativity at different educational stages.' Thinking skills and creativity 19: 246-259.

Gajda, A., Beghetto, R. A., & Karwowski, M. (2017a). Exploring creative learning in the classroom: A multi-method approach. *Thinking skills and creativity, 24*, 250-267. https://doi.org/10.1016/j.tsc.2017.04.002

Gajda, A., Karwowski, M., & Beghetto, R. A. (2017b). Creativity and academic achievement: a meta-analysis. *Journal of Educational Psychology* (2), 269. doi:10.1037/edu0000133

Galang, A. J. R. (2010). The prosocial psychopath: Explaining the paradoxes of the creative personality. *Neuroscience & Biobehavioral Reviews, 34*(8), 1241-1248.

Galatis, A. (2013). Critical Thinking in Education: Reflections on its perceived levels, method and point. *Measuring Up in Education*, 64.

Gallop (2016). 2016 Gallup® Student Poll: A Snapshot of Results and Findings. Retrieved from https://www.sac.edu/research/PublishingImages/Pages/research-studies/2016%20Gallup%20Student%20Poll%20Snapshot%20Report%20Final.pdf

Galton, M., Hargreaves, L., Comber, C., Wall, D., & Pell, T. (1999). Changes in patterns of teacher interaction in primary classrooms: 1976-96. *British Educational Research Journal, 25*(1), 23-37.

Geake, J. (2008). Neuromythologies in education. *Educational Research, 50*(2), 123-133.

Geake, J. (2011). Position Statement on Motivations, Methodologies, and Practical Implications of Educational Neuroscience Research: fMRI studies of the neural correlates of creative intelligence. *Educational Philosophy and Theory, 43*(1), 43-47.

Geake, J. G. (2004). A Neuropsychological Model of Creative Intelligence.

Gentner, D. (1988). Metaphor as Structure Mapping: The Relational Shift. Child Development, 59(1), 47–59. https://doi.org/10.2307/1130388

Gentry, M., Steenbergen-Hu, S., & Choi, B.-y. (2011). Student-identified exemplary teachers: Insights from Talanted teachers. *Gifted Child Quarterly, 55*(2), 111-125.

Georgiou, G. K., & Das, J. (2015). University students with poor reading comprehension: The hidden cognitive processing deficit. *48*(5), 535-545.

Ghisletta, P., & Lubart, T. (2014). Toward an Integrative Model of Creativity and Personality:

Theoretical Suggestions and Preliminary Empirical Testing. *The Journal of Creative Behavior*.

Gibson, J. J. (1977). The theory of affordances. *Hilldale, USA*, *1*(2).

Gibson, J. J. (1979/1986). *The ecological approach to perception.* Hillsdale, NJ: Lawrence Erlbaum Associates.

Gibson, E. J. (2000). Where Is the Information for Affordances? *Ecological Psychology, 12*(1), 53-56. doi:10.1207/S15326969ECO1201_5

Gibson, J. J. (2014). *The ecological approach to visual perception: classic edition*: Psychology Press.

Gibson, J. J., & Gibson, E. J. (1955). Perceptual learning: Differentiation or enrichment?. *Psychological review*, *62*(1), 32.

Gilchrist, M. (1972). *The psychology of creativity*: Melbourne University Press Melbourne.

Gilger, J. W., Talavage, T. M., & Olulade, O. A. (2013). An fMRI study of nonverbally gifted reading disabled adults: has deficit compensation effected gifted potential? *Frontiers in Human Neuroscience, 7*.

Gilhooly, K., Fioratou, E., Anthony, S., & Wynn, V. (2007). Divergent thinking: Strategies and executive involvement in generating novel uses for familiar objects. *British Journal of Psychology, 98*(4), 611-625.

Gino, F., & Ariely, D. (2012). The dark side of creativity: original thinkers can be more dishonest. *Journal of personality and Social Psychology, 102*(3), 445.

Glass, T. (2013). Creating learning environments for disengaged boys: Bridging the gender gap with universal design for learning.

Glăveanu, V.P., (2013). Rewriting the language of creativity: The Five A's framework. *Review of General Psychology, 17*(1), 69-81.

Glăveanu, V. P. (2015). Creativity as a Sociocultural Act. *The Journal of Creative Behavior*(3), 165. doi:10.1002/jocb.94

Glăveanu, V. P. (2015). On units of Analysis and Creativity Theory: Towards a 'Molecular' Perspective. *Journal for the Theory of Social Behaviour*(3), 311. doi:10.1111/jtsb.12069

Glăveanu, V. P. (2010). Paradigms in the study of creativity: Introducing the perspective of cultural psychology. *New Ideas in Psychology, 28*(1), 79-93.

Glăveanu, V. P. (2012). What can be done with an egg? Creativity, material objects, and the theory of affordances. *The Journal of Creative Behavior, 46*(3), 192-208.

Glăveanu, V. P. (2014). *Distributed creativity: Thinking outside the box of the creative individual*: Springer.

Glăveanu, V. P. (2014). Distributed Creativity: What Is It? In *Distributed Creativity* (pp. 1-13): Springer.

Glăveanu, V. P. (2016). The psychology of creating: A cultural-developmental approach to key dichotomies within creativity studies. In *The Palgrave Handbook of Creativity and Culture Research* (pp. 205-223): Springer.

Glăveanu, V. P., Ness, I. J., & de Saint Laurent, C. (2020). Creativity, Learning and Technology: Opportunities, Challenges and New Horizons. *Creativity Research Journal, 32*(1), 1-3. doi:10.1080/10400419.2020.1712167

Glăveanu, V. P. (2015). Creativity as a sociocultural act. *The Journal of Creative Behavior*, *49*(3), 165-180.

Glăveanu, V. P. (2018). Educating which creativity?. Thinking Skills and Creativity, 27, 25-32.

Glaveanu, V. P., Hanchett Hanson, M., Baer, J., Barbot, B., Clapp, E. P., Corazza, G. E., ... & Sternberg, R. J. (2020). Advancing creativity theory and research: A socio-cultural manifesto. The Journal of Creative Behavior, 54(3), 741-745.

Goertzel, M. G., & Goertzel, G. V. H. (1960). Intellectual and emotional climate in families procuring eminence. *Gifted Child Quarterly, 4*(3), 59-60.

Goetz, T., Lüdtke, O., Nett, U. E., Keller, M. M., & Lipnevich, A. A. (2013). Characteristics of teaching and students' emotions in the classroom: Investigating differences across domains. *Contemporary educational psychology, 38*(4), 383-394. https://doi.org/10.1016/j.cedpsych.2013.08.001

Goss, P., Sonnemann, J., &Griffiths, K. . (2017). Engaging students: creating classrooms that improve learning. Grattan Institute.

Goswami, U., & Brown, A. L. (2002). Higher-order structure and relational reasoning. *Critical Readings on Piaget*, 209.

Gowing, A., & Jackson, A. C. (2016). Connecting to School: Exploring Student and Staff Understandings of Connectedness to School and the Factors Associated with This Process. *The Educational and Developmental Psychologist, 33*(1), 54-69.

Gravetter, F. J., & Forzano, L.-A. B. (2015). *Research methods for the behavioral sciences*: Nelson Education.

Gray, D. E. (2013). *Doing research in the real world*: Sage.

Gray, N. S., Fernandez, M., Williams, J., Ruddle, R. A., & Snowden, R. J. (2002). Which schizotypal dimensions abolish latent inhibition? *British Journal of Clinical Psychology, 41*(3), 271-284.

Granger, K. T., Moran, P. M., Buckley, M. G., & Haselgrove, M. (2016). Enhanced latent

inhibition in high schizotypy individuals. *Personality and Individual Differences, 91*, 31-39. https://doi.org/10.1016/j.paid.2015.11.040

Greene, B. A., & Miller, R. B. (1996). Influences on achievement: Goals, perceived ability, and cognitive engagement. *Contemporary Educational Psychology*, *21*(2), 181-192.

Guilford, J. P. (1977). *Way beyond the IQ*. Creative Education Foundation.

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2014). *Multivariate Data Analysis: Pearson New International Edition* (Vol. Seventh edition). Harlow, Essex: Pearson.

Hammill, D. D. (1998). *Detroit tests of learning aptitude*: Pro-ed.

Hamre, B. K. & Pianta R. C. (2001). 'Early teacher–child relationships and the trajectory of children's school outcomes through eighth grade.' **72**(2): 625-638.

Harris, A., & Ammermann, M. (2016). The changing face of creativity in Australian education. *Teaching Education, 27*(1), 103-113.

Harris, A., & de Bruin, L. (2017). STEAM Education: Fostering creativity in and beyond secondary schools. *australian art education, 38*(1), 54.

Harrison, A. O., Pine C. J., Chan S.Q., & Buriel R. (1990). Family ecologies of ethnic minority children. *Child Development.* (61), 347–362.

Haslam, S. A., Adarves-Yorno, I., Postmes, T., & Jans, L. (2013). The Collective Origins of Valued Originality A Social Identity Approach to Creativity. *Personality and Social Psychology Review, 17*(4), 384-401.

Heacox, D. (2012). *Differentiating instruction in the regular classroom: How to reach and teach all learners (Updated anniversary edition)*: Free Spirit Publishing.

Hearne, L. J., Lin, H. Y., Sanz-Leon, P., Tseng, W., Gau, S., Roberts, J., & Cocchi, L. (2019). ADHD symptoms map onto noise-driven structure–function decoupling between hub and peripheral brain regions. *Molecular psychiatry*, 1-10.

Heller. (1991). THE NATURE AND DEVELOPMENT OF GIFTEDNESS: A LONGITUDINAL STUDY. *European Journal of High Ability, 2*(2), 174-188. doi:10.1080/0937445910020207

Heller, K. A. (2013). Perspectives on Gifted Education in the Third Millennium. In *Creativity, Talent, and Excellence* (pp. 231-246): Springer.

Heller, K. A., Mönks, F. J., Subotnik, R., & Sternberg, R. J. (2000). *International handbook of Giftedness and Talent*: Elsevier.

Heller, K. A., & Perleth, C. (2008). The Munich High Ability Test Battery (MHBT): A multidimensional, multimethod approach. *Psychology Science, 50*(2), 173.

Heller, K. A., Perleth, C., & Lim, T. K. (2005). The Munich model of giftedness designed to identify and promote gifted students. *Conceptions of giftedness, 2*, 147-170.

Hempel-Jorgensen, A. J. (2009). The construction of the 'ideal pupil'and pupils' perceptions of 'misbehaviour'and discipline: contrasting experiences from a low-socio-economic and a high-socio-economic primary school. *30*(4), 435-448.

Henderson, L. C. (2018). Reflecting on the DMGT in the Australian Context: Response to Merrotsy. *Australasian Journal of Gifted Education, 27*(1), 59-65.

Hennessey, B. A. (2003). Is the social psychology of creativity really social? Moving beyond a focus on the individual. *Group creativity: Innovation through collaboration*, 181-201.

Hennessey, B. A. (2003). Is the social psychology of creativity really social? Moving beyond a focus on the individual. *Group creativity: Innovation through collaboration*, 181-201.

Henricsson, L., & Rydell, A. M. (2004). Elementary school children with behavior problems: Teacher-child relations and self-perception. A prospective study. *Merrill-Palmer Quarterly (1982-)*, 111-138.

Hertberg-Davis, H., & Callahan, C. M. (2008). A narrow escape: Gifted students' perceptions of Advanced Placement and International Baccalaureate programs. *Gifted Child*

Quarterly, 52(3), 199-216.

Hirschfield, P. J., & Gasper, J. (2011). The relationship between school engagement and delinquency in late childhood and early adolescence. *Journal of Youth and Adolescence*, *40*(1), 3-22.

Hitchcock, C., Meyer, A., Rose, D., & Jackson, R. J. (2002). Providing new access to the general curriculum: Universal design for learning. *35*(2), 8-17.

Hooks, B. (2014). *Teaching to transgress*: Routledge.

Hospel, V., Galand, B., & Janosz, M. (2016). Multidimensionality of behavioural engagement: Empirical support and implications. *International Journal of Educational Research, 77*, 37-49. https://doi.org/10.1016/j.ijer.2016.02.007

Huang, L. V. (2011). Simultaneous processing. *Encyclopedia of clinical neuropsychology*, 2301-2302.

Hsieh, P. H. Cho. Y., Liu, M., & Schallert, DL (2008). Examining the interplay between middle school students' achievement goals and self-efficacy in a technology-enhanced learning environment. *American Secondary Education Journal*, *36*(3), 33-50.

Immordino-Yang, M. H. (2011). Implications of affective and social neuroscience for educational theory. *Educational Philosophy and Theory, 43*(1), 98-103.

Immordino-Yang, M. H., & Damasio, A. (2007). We feel, therefore we learn: The relevance of affective and social neuroscience to education. *Mind, Brain, and Education, 1*(1), 3-10.

Immordino-Yang, M. H., & Faeth, M. (2010). Building smart students: A neuroscience perspective on the role of emotion and skilled intuition in learning. *Mind, brain and education: Neuroscience implications for the classroom*, 66-81.

Jacquet, J., Delpech, L., Bronchain, J., & Raynal, P. (2020). Creative Competencies and

Cognitive Processes Associated with Creativity are Linked with Positive Schizotypy. *Creativity Research Journal*, 1-9. doi:10.1080/10400419.2020.1733895

Jaussi, K. S., Randel, A. E., & Dionne, S. D. (2007). I am, I think I can, and I do: The role of personal identity, self-efficacy, and cross-application of experiences in creativity at work. *Creativity Research Journal, 19*(2-3), 247-258.

Jennings, P. A., & Greenberg, M. T. (2009). The prosocial classroom: Teacher social and emotional competence in relation to student and classroom outcomes. Review of educational research, 79(1), 491-525.

Johnson, B. (2008). Teacher–student relationships which promote resilience at school: A micro-level analysis of students' views. *British Journal of Guidance & Counselling*, *36*(4), 385-398.

Jones, S., & Vagle, M. D. (2013). Living Contradictions and Working for Change: Toward a theory of social class–sensitive pedagogy. *42*(3), 129-141.

Jung, R. E., & Haier, R. J. (2007). The Parieto-Frontal Integration Theory (P-FIT) of intelligence: Converging neuroimaging evidence. *Behavioral and Brain Sciences, 30*(02), 135-154. doi:10.1017/S0140525X07001185

Jung, R. E., Mead, B. S., Carrasco, J., & Flores, R. A. (2013). The structure of creative cognition in the human brain. *Frontiers in Human Neuroscience, 7*.

Jung, R. E., Segall, J. M., Jeremy Bockholt, H., Flores, R. A., Smith, S. M., Chavez, R. S., & Haier, R. J. (2010). Neuroanatomy of creativity. *Human brain mapping, 31*(3), 398-409.

Junod, R. E. V., DuPaul, G. J., Jitendra, A. K., Volpe, R. J., & Cleary, K. S. (2006). Classroom observations of students with and without ADHD: Differences across types of engagement. *Journal of School Psychology*, *44*(2), 87-104.

Kanevsky, L. (2011). Deferential differentiation: What types of differentiation do students

want? *Gifted Child Quarterly, 55*(4), 279-299.

Karwowski, M. (2010). Are creative students really welcome in the classrooms? Implicit theories of 'good' and 'creative' student' personality among polish teachers. *Procedia - Social and Behavioral Sciences, 2*(2), 1233-1237. https://doi.org/10.1016/j.sbspro.2010.03.179

Karwowski, M. (2012). Did curiosity kill the cat? Relationship between trait curiosity, creative self-efficacy and creative personal identity. *Europe's Journal of Psychology, 8*(4), 547-558.

Karwowski, M., Gralewski, J., Patston, T., Cropley, D. H., Kaufman, J. C. & Creativity. (2020). The creative student in the eyes of a teacher: A cross-cultural study. *35*, 100636.

Kolb, K. J., & Jussim, L. (1994). Teacher expectations and underachieving gifted children. *Roeper Review, 17*(1), 26-30.

Handy, T. C., & Kam, J. W. (2015). Mind wandering and selective attention to the external world. *Canadian Journal of Experimental Psychology/Revue canadienne de psychologie expérimentale*, *69*(2), 183.

Kanevsky, L. (2011). Deferential differentiation: What types of differentiation do students want? *Gifted Child Quarterly, 55*(4), 279-299.

Kaufman, J. C., & Beghetto, R. A. (2009). Beyond Big and Little: The Four C Model of Creativity. Review of General Psychology, 13, 1-12.

Kaufman, J. C., & Beghetto, R. A. (2013). In praise of Clark Kent: Creative metacognition and the importance of teaching kids when (not) to be creative. *Roeper Review, 35*(3), 155-165.

Kaufman, J. C., Glăveanu, V. P., & Baer, J. (2017). *The Cambridge handbook of creativity across domains*: Cambridge University Press.

Kaufman, J. C., Kaufman, S. B., Beghetto, R. A., Burgess, S. A., & Persson, R. S. (2009). Creative giftedness: Beginnings, developments, and future promises. In *International handbook on giftedness* (pp. 585-598): Springer.

Kaufman, J. C., Kaufman, S. B., & Lichtenberger, E. O. (2011). Finding creative potential on intelligence tests via divergent production. *Canadian Journal of School Psychology, 26*(2), 83-106.

Kaufman, J. C., Kaufman, S. B., & Plucker, J. A. (2013). Contemporary Theories of Intelligence. *Oxford Handbook of Cognitive Psychology, Oxford University Press, Oxford*.

Kaufman, S. B. (2007). Investigating the role of domain general mechanisms in the acquisition of domain specific expertise. *High Ability Studies, 18*(1), 71-73.

Kaufman, S. B. (2007). Review of Explaining Creativity: The Science of Human Innovation.

Kaufman, S. B. (2009). Beyond general intelligence: The dual-process theory of human intelligence.

Kaufman, S. B. (2009). Faith in intuition is associated with decreased latent inhibition in a sample of high-achieving adolescents. *Psychology of Aesthetics, Creativity, and the Arts, 3*(1), 28.

Kaufman, S. B. (2011). Intelligence and the cognitive unconscious. *The Cambridge handbook of intelligence*, 442-467.

Kaufman, S. B. (2013). Ungifted: Intelligence Redefined. *Basic Books*.

Kaufman, S. B., DeYoung, C. G., Gray, J. R., Brown, J., & Mackintosh, N. (2009). Associative learning predicts intelligence above and beyond working memory and processing speed. *Intelligence, 37*(4), 374-382.

Kaufman, S. B., DeYoung, C. G., Gray, J. R., Jiménez, L., Brown, J., & Mackintosh, N. (2010). Implicit learning as an ability. *Cognition, 116*(3), 321-340.

Kaufman, S. B., DeYoung, C. G., Reis, D. L., & Gray, J. R. (2011). General intelligence predicts reasoning ability even for evolutionarily familiar content. *Intelligence, 39*(5), 311-322.

Kaufman, S. B., & Kaufman, J. C. (2007). Ten years to expertise, many more to greatness: An investigation of modern writers. *The Journal of Creative Behavior, 41*(2), 114-124.

Kaufman, S. B., Reynolds, M. R., Liu, X., Kaufman, A. S., & McGrew, K. S. (2012). Are cognitive g and academic achievement g one and the same g? An exploration on the Woodcock–Johnson and Kaufman tests. *Intelligence, 40*(2), 123-138.

Kaufman, S. B., Sternberg, R., & Kaufman, S. (2011). Intelligence and the cognitive unconscious. *The Cambridge handbook of intelligence*, 442-467.

Kaufman, S. B., & Sternberg, R. J. (2007). Giftedness in the Euro-American culture. *Conceptions of giftedness: Socio-cultural perspectives*, 377-413.

Kaufman, S. B., & Sternberg, R. J. (2008). Conceptions of giftedness. *Handbook of giftedness in children*, 71-91.

Kavenagh, M., Freeman, E., & Ainley, M. (2012). Differences between Adolescent Boys' and Teachers' Perceptions of the Student–Teacher Relationship. *The Australian Educational and Developmental Psychologist, 29*(1), 1-16. doi:10.1017/edp.2012.3

Kearney, C. A. (2008). School absenteeism and school refusal behavior in youth: A contemporary review. *Clinical psychology review, 28*(3), 451-471.

Kelly, F. J., & Veldman, D. J. (1964). Delinquency and school dropout behavior as a function of impulsivity and nondominant values. *The Journal of Abnormal and Social Psychology, 69*(2), 190.

Kim, K., Kaufman, J., Baer, J., & Sriraman, B. (2012). Grounding Creative Giftedness in The Body.

Kim, K., Kim, M., & Hull. (2012). Creative Personality and Anticreative Environment for High

School Dropouts. *Creativity Research Journal, 24*(2-3), 169-176.

Kim, K. H. (2005). Can only intelligent people be creative? A meta-analysis. *Prufrock Journal, 16*(2-3), 57-66.

Kim, K. H. (2006). Can we trust creativity tests? A review of the Torrance Tests of Creative Thinking (TTCT). *Creativity Research Journal, 18*(1), 3-14.

Kim, K. H. (2008). Underachievement and creativity: Are gifted underachievers highly creative? *Creativity Research Journal, 20*(2), 234-242.

Kim, K. H., & Hull, M. F. (2012). Creative Personality and Anticreative Environment for High School Dropouts. *Creativity Research Journal, 24*(2-3), 169-176.

Kim, K. H., Kaufman, J. C., & Baer, J. (2013). *Creatively Gifted Students are Not Like Other Gifted Students: Research, Theory, and Practice*: SensePublishers.

Kim, K. H., & Pierce, R. A. (2013). decline of creativity in America. *The Routledge International Handbook of Innovation Education*, 153.

Kim, K. H., & VanTassel-Baska, J. (2010). The relationship between creativity and behavior problems among underachieving elementary and high school students. *Creativity Research Journal, 22*(2), 185-193.

Kim, K.-N. (2013). Career trajectory in high school dropouts. *The Social Science Journal, 50*(3), 306-312. https://doi.org/10.1016/j.soscij.2013.03.005

King, T. M., Rosenberg, L. A., Fuddy, L., McFarlane, E., Sia, C., Duggan, A. K., & Pediatrics, B. (2005). Prevalence and early identification of language delays among at-risk three-year olds. *26*(4), 293-303.

Klein, G. (2011). Critical thoughts about critical thinking. *Theoretical Issues in Ergonomics Science*, *12*(3), 210-224.

Klem, A. M., & Connell, J. P. (2004). Relationships matter: Linking teacher support to student engagement and achievement. *Journal of school health*, *74*(7), 262-273.

Kress, G. (2000). 'You've Just Got to Learn How to See': Curriculum Subjects, Young People and Schooled Engagement with the World. *Linguistics gifted*

ucation, *11*(4), 401-415.

Ladd, G. W., & Dinella, L. M. (2009). Continuity and change in early school engagement: Predictive of children's achievement trajectories from first to eighth grade? *, 101*(1), 190.

Ladd, G. W., Birch, S. H., & Buhs, E. S. (1999). Children's social and scholastic lives in kindergarten: Related spheres of influence?. *Child development*, *70*(6), 1373-1400.

Lamb, S., & Huo, S. (2017). Counting the costs of lost opportunity in Australian education.

Lamb, S., & Rice, S. (2008). Effective intervention strategies for students at risk of early leaving. *Centre for Post-compulsory Education and Lifelong Learning. The university of Melbourne*.

Landis, R. N., & Reschly, A. L. (2013). Reexamining gifted underachievement and dropout through the lens of student engagement. *Journal for the Education of the Gifted, 36*(2), 220-249.

Lassus-Sangosse, D., N'guyen-Morel, M.-A., & Valdois, S. J. V. R. (2008). Sequential or simultaneous visual processing deficit in developmental dyslexia? *48*(8), 979-988.

Laws, J. (2002). *Self-efficacy beliefs and creative performance in adults: A phenomenological investigation*: University of Ottawa (Canada).

Learning, P. P. (2015). P21 Framework Definitions Document. Retrieved from: http://www.p21.org/storage/documents/docs/P21_Framework_Definitions_New_Logo_2015.pdf).

Lee, J.-S. (2012). The effects of the teacher–student relationship and academic press on student engagement and academic performance. *International Journal of Educational Research, 53*, 330-340.

Legault, L., Green-Demers, I., & Pelletier, L. (2006). Why do high school students lack motivation in the classroom? Toward an understanding of academic amotivation and the role of social support. *Journal of Educational Psychology, 98*(3), 567.

Lemons, G. K. (2005). *A qualitative investigation of college students' creative self-efficacy.* (3202456 Ph.D.), University of Northern Colorado, Ann Arbor. Retrieved from http://search.proquest.com.ezp.lib.unimelb.edu.au/docview/305428613?accountid=12372

Lenarčič, A., & Winter, M. (2013). Affordances in Situation Theory. *Ecological Psychology, 25*(2), 155-181. doi:10.1080/10407413.2013.780495

Li, W., Li, X., Huang, L., Kong, X., Yang, W., Wei, D., Qiu, J. (2014). Brain structure links trait creativity to openness to experience. *Social cognitive and affective neuroscience*, nsu041.

Liem, G. A. D., & Chong, W. H. (2017). Fostering student engagement in schools: International best practices. *School Psychology International, 38*(2), 121-130. doi:10.1177/0143034317702947

Liem, G. A., & Martin, A. J. (2012). The Motivation and Engagement Scale: Theoretical framework, psychometric properties, and applied yields. *47*(1), 3-13.

Lindsay, G., Dockrell, J. E., & Strand, S. J. (2007). Longitudinal patterns of behaviour problems in children with specific speech and language difficulties: Child and contextual factors. *77*(4), 811-828.

List, A., & Alexander, P. A. (2017). Cognitive affective engagement model of multiple source

use. *Educational Psychologist, 52*(3), 182-199.

Locke, A., Ginsborg, J., Peers, I. J., & Disorders, C. (2002). Development and disadvantage: implications for the early years and beyond. *37*(1), 3-15.

Lohman, D. F., Korb, K. A., & Lakin, J. M. (2008). Identifying academically gifted English-language learners using nonverbal tests: A comparison of the Raven, NNAT, and CogAT. *52*(4), 275-296.

Lonergan, D. C., Scott, G. M., & Mumford, M. D. (2004). Evaluative aspects of creative thought: Effects of appraisal and revision standards. *Creativity Research Journal, 16*(2-3), 231-246.

Lovelace, M. D., Reschly, A. L., & Appleton, J. J. (2017). Beyond School Records: The Value of Cognitive and Affective Engagement in Predicting Dropout and On-Time Graduation (Featured Research). *Professional School Counseling, 21*(1), 70-84.

Lubart, T., Besançon, M., & Barbot, B. (2011). Evaluation du potentiel créatif (EPoC). *Paris, France: Editions Hogrefe*.

Lubart, T., & Guignard, J.-H. (2004). The Generality-Specificity of Creativity: A Multivariate Approach.

Lubart, T. I. (1990). Creativity and Cross-Cultural Variation. *International Journal of Psychology, 25*(1), 39.

Lubart, T. I. (2001). Models of the creative process: Past, present and future. *Creativity research journal*, *13*(3-4), 295-308.

Lubart, T. I., & Mouchiroud, C. (2003). Creativity: A Source of Difficulty in Problem Solving. *The psychology of problem solving*, 127.

Lubow, R., Schnur, P., & Rifkin, B. (1976). Latent inhibition and conditioned attention theory. *Journal of Experimental Psychology: Animal Behavior Processes, 2*(2), 163.

Lubow, R. E., & Gewirtz, J. C. (1995). Latent inhibition in humans: data, theory, and implications for schizophrenia. *Psychological bulletin*, *117*(1), 87.

Ludwig, A. M. (1992). Culture and creativity. *American Journal of Psychotherapy, 46*(3), 454-469.

Lund Dean, K., & Jolly, J. P. (2012). Student identity, disengagement, and learning. *Academy of Management Learning & Education*, *11*(2), 228-243.

MacKinnon, D. W. (1963). Creativity and images of the self. *The study of lives*, *251*, 278.

Marks, H. M. (2000). Student engagement in instructional activity: Patterns in the elementary, middle, and high school years. *American educational research journal, 37*(1), 153-184.

Martindale, C., & Dailey, A. (1996). Creativity, primary process cognition and personality. *Personality and Individual Differences, 20*(4), 409-414. http://dx.doi.org/10.1016/0191-8869(95)00202-2

Maslow, A., & Lewis, K. J. (1987). Maslow's hierarchy of needs. *Salenger Incorporated, 14*, 987.

Mason, O., & Claridge, G. (2006). The Oxford-Liverpool Inventory of Feelings and Experiences (O-LIFE): further description and extended norms. *Schizophrenia research, 82*(2), 203-211.

Matthews, D. (2014). Gifted Education in Transition: From Elitist Enclave to Promising Opportunities for Empowerment and Inclusion. *International Journal for Development and Creativity*, 23.

Matthews, M., Peters, S., McBee, M., & McCoach, D. B. (2013). Beyond gifted education: Designing and implementing advanced academic programs. Sourcebooks, Inc.

Maxwell, Daniel. (1998). Can qualitative and quantitative methods serve complementary purposes for policy research?. International Food Policy Research Institute (IFPRI),

FCND discussion papers.

McArdle, J. J., Hamagami, F., Meredith, W., & Bradway, K. P. (2000). Modeling the dynamic hypotheses of Gf–Gc theory using longitudinal life-span data. *Learning and Individual Differences, 12*(1), 53-79. https://doi.org/10.1016/S1041-6080(00)00036-4

McBee, M. T., McCoach, D. B., Peters, S. J., & Matthews, M. S. (2012). The Case for a Schism: A Commentary on Subotnik, Olszewski-Kubilius, and Worrell (2011). Gifted Child Quarterly, 56(4), 210–214. https://doi.org/10.1177/0016986212456075

McClelland, M. M., Morrison, F. J., & Holmes, D. L. (2000). Children at risk for early academic problems: The role of learning-related social skills. *15*(3), 307-329.

McCoach, D. B., & Siegle, D. (2003). Factors that differentiate underachieving gifted students from high-achieving gifted students. *Gifted Child Quarterly*(2), 144.

McIntyre, P. (2008). The systems model of creativity: Analyzing the distribution of power in the studio. *Journal on the Art of Record Production, 3*.

McLeod, J., & Yates, L. (2006). *Making Modern Lives : Subjectivity, Schooling, and Social Change*. Albany, NY: State University of New York Press.

McMillan, R. L., Kaufman, S. B., & Singer, J. L. (2013). Ode to positive constructive daydreaming. *Frontiers in psychology, 4*.

McRae, K., & Jones, M. (2013). 14 Semantic Memory. *The Oxford handbook of cognitive psychology, 206*.

Mlambo, T., Jelsma, J., Rusakaniko, S., Dale, N., & Chingono, A. J. (2017). Predictors of Zimbabwean children's neuro-cognitive performance on the Detroit Tests of Learning Aptitude fourth edition (DTLA-4): Implications for policy, practice and research. *73*(2), 94-106.

Mohanty, A. (1994). Verbal and non-verbal dimensions in simultaneous and successive processings: Difference between normal and reading disabled children. *Social Science International*.

Mönks, F. J., & Mason, E. J. (2000). Developmental Psychology and Giftedness: Theories. International handbook of giftedness and , 141.

Montuoro, P., & Lewis, R. (2015). Student perceptions of misbehaviour and classroom management. *Handbook of classroom management*, 344-362.

Morris, M. (2000). School improvement: the contribution of careers education and guidance. Paper presented at the European Conference on Educational Research, Edinburgh, 20-23 September 2000. accessed: http://www.leeds.ac.uk/educol/documents/00001645.htm

Morrison, G. M., & Allen, M. R. (2007). Promoting student resilience in school contexts. *Theory Into Practice, 46*(2), 162-169.

Muller, C. (2001). The role of caring in the teacher-student relationship for at-risk students. *Sociological inquiry, 71*(2), 241-255.

Munro, J. (2002). The reading characteristics of gifted literacy disabled students. *Australian Journal of Learning Difficulties*, *7*(2), 4-12.

Munro, J. (2003). Distinguishing gifted and Talented learners and other learners. *Faculty of Education, University of Melbourne, Australia*.

Munro, J. (2005a). the learning characteristics of gifted literacy disabled students. *Gifted Education International, 19*(2), 154-172.

Munro, J. (2005b). The Thinking Space. retrieved from https://students.education.unimelb.edu.au/selage/.

Munro, J. (2005c). Creative and Critical/Evaluative Thinking. *SELAGE*,

https://students.education.unimelb.edu.au/selage/pub/readings/creativity/FCT-Creativitycritical.pdf.

Munro, J. (2006a). Motivating learning: Why do we learn? retrieved from https://students.education.unimelb.edu.au/selage/.

Munro, J. (2006b). Psychology of Exceptional Learning: How knowledge is Organised. retrieved from https://students.education.unimelb.edu.au/selage/.

Munro, J. (2006c). Social-cultural Influences on Learning. *https://students.education.unimelb.edu.au/selage/pub/readings/psyexlearn/PELculturaleffects.pdf*.

Munro, J. (2007). Knowledge Enhancement Perspective on Learning. *Alternative Models of Learning for the OECD Centre for Educational Research and Innovation*.

Munro, J. (2011a). *Gifted Students Who Have Academic Learning Difficulties: Analytical Sequential Processing Problems?*: Australian Association for the Education of the Gifted and Talented.

Munro, J. (2011b). Identifying gifted knowledge and learning in Indigenous cultures: Africa and Australia. *Giftedness from an Indigenous Perspective*.

Munro, J. (2013). *Teaching gifted students: A knowing and thinking-based framework for differentiation*: Centre for Strategic Education.

Munro, J. (2015). Scenario problem solving: A measure of the quality of gifted students' thinking [online]. . . *Australasian Journal of Gifted Education, Vol. 24, No. 1, Jun 2015: 23-29*.

Munro, J. (in press). Creativity and Brain Processes: How neuroscience can help us understand how gifted and Talented students learn and the implications for teaching. *Giftedness Through the Lens of Creativity*.

Munro, J., & Howes, D. (1998). The effect of cognitive style on learning to write a letter of complaint. *British Journal of Educational Psychology, 68*(2), 243-254.

Naber, M., Frässle, S., Rutishauser, U., & Einhäuser, W. (2013). Pupil size signals novelty and predicts later retrieval success for declarative memories of natural scenes. *Journal of vision, 13*(2), 11.

Nagane, M. (2004). Relationship of subjective chronic fatigue to academic performance. *Psychological reports, 95*(1), 48-52.

Nation, K., & Norbury, C. F. (2005). Why reading comprehension fails: Insights from developmental disorders. *Topics in language disorders*, *25*(1), 21-32.

Nelson, K. E., Welsh, J. A., Trup, E. M., & Greenberg, M. T. (2011). Language delays of impoverished preschool children in relation to early academic and emotion recognition skills. *31*(2), 164-194.

Newmann, F. M. (1992). *Student engagement and achievement in American secondary schools*: ERIC.

Nippold, M. A. (2002). Lexical learning in school-age children, adolescents, and adults: A process where language and literacy converge. *Journal of Child Language*, *29*(2), 449.

Nusbaum, E. C., & Silvia, P. J. (2011). Are intelligence and creativity really so different?: fluid intelligence, executive processes, and strategy use in divergent thinking. *Intelligence, 39*(1), 36-45.

O'Connell, M. J. & Watterston, J. (2019). Those Who Disappear: The Australian education problem nobody wants to talk about. *The University of Melbourne - Industry Report #1*.

O'Reilly, T., Dunbar, R., & Bentall, R. (2001). Schizotypy and creativity: an evolutionary connection? *Personality and Individual Differences, 31*(7), 1067-1078. http://dx.doi.org/10.1016/S0191-8869(00)00204-X

Ogbu, J. U. (1992). Understanding cultural diversity and learning. *Educational researcher, 21*(8), 5-14.

Olszewski-Kubilius, P. (2000). The transition from childhood giftedness to adult creative productiveness: Psychological characteristics and social supports. *Roeper Review, 23*(2), 65-71.

Ochse, R. (1993). Before the gates of excellence: The determinants of creative genius. Cambridge, England: Cambridge University Press.

Paivio, A. (1969). Mental imagery in associative learning and memory. *Psychological review, 76*(3), 241.

Paivio, A. (1990). *Mental representations: A dual coding approach*: Oxford University Press.

Paivio, A. (1991). Dual coding theory: Retrospect and current status. *Canadian Journal of Psychology/Revue canadienne de psychologie, 45*(3), 255.

Paletz, S. B., & Schunn, C. D. (2010). A social-cognitive framework of multidisciplinary team innovation. *Topics in Cognitive Science, 2*(1), 73-95. doi:10.1111/j.1756-8765.2009.01029.x

Passow, A. H. (1986). Educational programs for minority/disadvantaged gifted students. Paper prepared for presentation in the Distinguished Lecturer Series of the San Diego Unified School District (San Diego, California, February 6, 1986).

Pedersen, A., & Dudgeon, P. (2002). *Indigenous children at school: A look beyond the scenes*: Gunada Press.

Perleth, C., Sierwald, W., & Heller, K. A. (1993). Selected results of the Munich longitudinal study of giftedness: The multidimensional/typological giftedness model. *Roeper Review, 15*(3), 149-155.

Perry, B. D. (2006). Applying principles of neurodevelopment to clinical work with maltreated and traumatized children: The neurosequential model of therapeutics.

Pfeiffer, S. I. (2008). Handbook of giftedness in children: Psychoeducational theory, research, and best practices.

Pfeiffer, S. I. (2015). *Essentials of Gifted Assessment*: John Wiley & Sons.

Phillipson, S., & Vialle, W. (2013). New directions in the study of s and creativity. *Development and Excellence, 5*(1), 1-5.

Phillipson, S. N., Stoeger, H., & Ziegler, A. (2013). *Exceptionality in East Asia: Explorations in The Actiotope Model of Giftedness*: Routledge.

Piaget, J., Brown, T., & Thampy, K. J. (1985). *The equilibration of cognitive structures: The central problem of intellectual development* (Vol. 985): University of Chicago Press Chicago.

Pianta, R. C., & Allen, J. P. (2008). Building capacity for positive youth development in secondary school classrooms: Changing teachers' interactions with students.

Pianta, R. C., & Walsh, D. J. (1998). Applying the construct of resilience in schools: Cautions from a developmental systems perspective. *School Psychology Review*, *27*(3), 407-417.

Piechowski, M. M. (1997). Emotional giftedness: The measure of intrapersonal intelligence. *Handbook of gifted education, 2*, 366-379.

Piechowski, M. M. (2003). From William James to Maslow and Dabrowski: Excitability of character and self-actualization. In D. Ambrose, L. M. Cohen, & A. J. Tannenbaum

(Eds.), *Creative intelligence: Toward theoretic integration.* (pp. 283-322). Cresskill, NJ, US: Hampton Press.

Piechowski, M. M., Colangelo, N., & Davis, G. (1991). Emotional development and emotional giftedness. *Handbook of gifted education, 2*, 366-381.

Pohl, M. (2014). Gifted Students and The Australian Curriculum. *Hawker Brownlow Education*.

Powers, E. A. (2008). The use of independent study as a viable differentiation technique for gifted learners in the regular classroom. *Gifted Child Today, 31*(3), 57-65.

Prabhakaran, R., Green, A. E., & Gray, J. R. (2013). Thin slices of creativity: Using single-word utterances to assess creative cognition. *Behavior research methods*, 1-19.

Preckel, F., Holling, H., & Wiese, M. (2006). Relationship of intelligence and creativity in gifted and non-gifted students: An investigation of threshold theory. *Personality and Individual Differences, 40*(1), 159-170.

Prosser, B., McCallum, F., Milroy, P., Comber, B., & Nixon, H. (2008). 'I am smart and I am not joking': Aiming High in the Middle Years of Schooling. *The Australian Educational Researcher, 35*(2), 15-35.

Rappolt-Schlichtmann, G., Ayoub, C. C., & Gravel, J. W. (2009). Examining the 'whole child' to generate usable knowledge. *Mind, Brain, and Education, 3*(4), 209-217.

Rasinski, T. V. (1984). Field Dependent/Independent Cognitive Style Research Revisited: Do Field Dependent Readers Read Differently Than Field Independent Readers? *, 5*(3), 303-322.

Raven, J. C. (1998). *Raven's progressive matrices*: Oxford Psychologists Press Oxford.

Raven, J.C. (2000). The Raven's progressive matrices: change and stability over culture and time. *Cognitive psychology*, *41*(1), 1-48.

Raven, J.C. (2009). The Raven Progressive Matrices and measuring aptitude constructs. *The International Journal of Educational and Psychological Assessment*.

Ravid, D., & Tolchinsky, L. (2002). Developing linguistic literacy: A comprehensive model. Journal of child language, 29(2), 417-447.

Redding, R. E. (1986). *Achievement motivation, cognitive style, and differential achievement patterns in underachieving gifted adolescents.* Vanderbilt University,

Redding, R. E. (1989). Underachievement in the verbally gifted: Implications for pedagogy. *26*(3), 275-291.

Redding, R. E. (1990). Learning preferences and skill patterns among underachieving gifted adolescents. *34*(2), 72-75.

Reis, S. M., & McCoach, D. B. (2000). The underachievement of gifted students: What do we know and where do we go? *Gifted Child Quarterly, 44*(3), 152-170.

Renzulli, J. S. (1986). *Systems and models for developing programs for the gifted and Talented*. Creative Learning Pr.

Renzulli, J. S. (1999). What is this thing called giftedness, and how do we develop it? A twenty-five year perspective. *Journal for the Education of the Gifted*, *23*(1), 3-54.

Renzulli, J.S (2005). *The Three-Ring Conception of Giftedness: A Developmental Model For Promoting Creative Productivity*.

Renzulli, J. S. (2002). Expanding the conception of giftedness to include co-cognitive traits and to promote social capital. *Phi Delta Kappan, 84*(1), 33-58.

Renzulli, J. S. (2005). *The Three-Ring Conception of Giftedness: A Developmental Model for Promoting Creative Productivity in Conceptions of Giftedness*: Cambridge University Press.

Renzulli, J. S., & De Wet, C. (2010). Developing creative productivity in young people through

the pursuit of ideal acts of learning. *Nurturing creativity in the classroom*, 24-72.

Renzulli, J. S., & Park, S. (2000). Gifted dropouts: The who and the why. *Gifted Child Quarterly, 44*(4), 261-271.

Renzulli, J. S., & Renzulli, S. R. (2010). The schoolwide enrichment model: A focus on student strengths and interests. *26*(2-3), 140-156.

Reschly, A. L., & Christenson, S. L. (2006). Prediction of dropout among students with mild disabilities: A case for the inclusion of student engagement variables. *Remedial and Special Education, 27*(5), 276-292.

Rhodes, M. (1961). An analysis of creativity. *The Phi Delta Kappan, 42*(7), 305-310.

Richardson, C., & Mishra, P. (2018). Learning environments that support student creativity: Developing the SCALE. *Thinnelsonskills and creativity, 27*, 45-54. https://doi.org/10.1016/j.tsc.2017.11.004

Rinn, A. N. (2012). Implications for Addressing the Psychosocial Needs of Gifted Individuals: A Response to Subotnik, Olszewski-Kubilius, and Worrell (2011). Gifted Child Quarterly, 56(4), 206–209. https://doi.org/10.1177/0016986212456076

Ripke, M., Huston, A. C., Eccles, J., & Templeton, J. (2008). The assessment of psychological, emotional, and social development indicators in middle childhood. *Key indicators of child and youth well-being: Completing the picture*, 131-165.

Rimm, S., & Lowe, B. (1988). Family environments of underachieving gifted students. *Gifted Child Quarterly*, *32*(4), 353-359.

Robertson, E. (1991). Neglected Dropouts The Gifted and Talented. *Equity & Excellence in Education, 25*(1), 62-73.

Robson, J., & Janniste, L. (2010). Growing future innovators: A new approach to learning programs for young children. *Mount Lawley: Edith Cowan University. Available at: http://www. pica. org. au/downloads/66/GFI_FINAL_EMAIL. pdf Accessed*, *2*, 12.

Roe, A. (1953). *The making of a scientist.* Dodd, Mead.

Rogoff, B. (2003). *THE Cultural Nature of Human Development*: New York: Oxford University Press.

Roorda, D. L., Jak, S., Zee, M., Oort, F. J., & Koomen, H. M. Y. (2017). Affective Teacher–Student Relationships and Students' Engagement and Achievement: A Meta-Analytic Update and Test of the Mediating Role of Engagement. *School Psychology Review, 46*(3), 239-261. doi:10.17105/SPR-2017-0035.V46-3

Roorda, D. L., Koomen, H. M. Y., Spilt, J. L., & Oort, F. J. (2011). The Influence of Affective Teacher–Student Relationships on Students' School Engagement and Achievement:A Meta-Analytic Approach. *Review of educational research, 81*(4), 493-529. doi:10.3102/0034654311421793

Roy, P., Chiat, S. & Dodd, B. (2014). *Language and Socioeconomic Disadvantage: From Research to Practice*. London, UK: City University London.

Rueda, R. (2006). Motivational And Cognitive Aspects of Culturally Accommodated Instruction. *Effective schools, 6*, 135.

Runco, M. A., & Bahleda, M. D. (1986). Implicit theories of artistic, scientific, and everyday creativity. *The Journal of Creative Behavior*.

Runco, M., & Chand, I. (2001). Creativity and cognition. *International encyclopedia of the social & behavioral sciences, 5*, 2892-2895.

Runco, M. A. (1991). *Divergent thinking*: Ablex Publishing Corporation.

Runco. (2003). Education for creative potential. *Scandinavian Journal of Educational*

Research, 47(3), 317-324.

Runco, M. A. (2004). Everyone has creative potential. *Creativity: From potential to realization*, 21-30.

Runco, M. A. (2005a). Motivation, Competence, and Creativity. In A. J. Elliot & C. S. Dweck (Eds.), *Handbook of competence and motivation* (pp. 609–623). Guilford Publications.

Runco, M. A. (2005b). *Creative Giftedness in Conceptions of Giftedness*: Cambridge University Press.

Runco, M. A. (2007). A Hierarchical Framework for the Study of Creativity. *New Horizons in Education, 55*(3), 1-9.

Runco, M. A. (2008). Commentary: Divergent thinking is not synonymous with creativity.

Runco, M. A. (2014). *Creativity: Theories and themes: Research, development, and practice*: Elsevier.

Runco, M. A. (2016). Commentary: Overview of Developmental Perspectives on Creativity and the Realization of Potential. *New Directions for Child and Adolescent Development, 2016*(151), 97-109. doi:10.1002/cad.20145

Runco, M. A., & Acar, S. (2012). Divergent Thinking as an Indicator of Creative Potential. *Creativity Research Journal, 24*(1), 66-75. doi:10.1080/10400419.2012.652929

Runco, M. A., & Bahleda, M. D. (1986). Implicit theories of artistic, scientific, and everyday creativity. *The Journal of Creative Behavior, 20*(2), 93-98.

Runco, M. A., & Chand, I. (1995). Cognition and creativity. *Educational psychology review, 7*(3), 243-267.

Runco, M. A., & Jaeger, G. J. (2012). The standard definition of creativity. *Creativity Research Journal, 24*(1), 92-96.

Ryan, R. M., & Deci, E. L. (2000). Intrinsic and extrinsic motivations: Classic definitions and new directions. *Contemporary educational psychology, 25*(1), 54-67.

Ryan, R. M., Stiller, J. D., & Lynch, J. H. (1994). Representations of relationships to teachers, parents, and friends as predictors of academic motivation and self-esteem. *The Journal of Early Adolescence, 14*(2), 226-249.

Saeed, S., & Zyngier, D. (2012). How motivation influences student engagement: a qualitative case study. *Journal of Education and Learning*, *1*(2), 252-267.

Sak, U. (2004). About creativity, giftedness, and teaching the creatively gifted in the classroom. *Roeper Review, 26*(4), 216-222.

Santoro, G. F. (2016). *Gifted knowledge: What does it look like?* (Doctoral dissertation). https://minerva-access.unimelb.edu.au/bitstream/handle/11343/92243/SANTORO%20GIUSEPPE%20PhD%20Thesis%20FInal.pdf?sequence=1

Savransky, S. D. (2000). *Engineering of creativity: Introduction to TRIZ methodology of inventive problem solving*. CRC press.

Schunk, D. H. (1991). Self-efficacy and academic motivation. *Educational psychologist*, *26*(3-4), 207-231.

Schunk, D. H., & Zimmerman, B. J. (2012). *Motivation and self-regulated learning: Theory, research, and applications*: Routledge.

Schussler, D. L. (2009). Beyond content: How teachers manage classrooms to facilitate intellectual engagement for disengaged students. *Theory Into Practice*, *48*(2), 114-121.

Schweizer, T. S. (2006). The psychology of novelty-seeking, creativity and innovation: neurocognitive aspects within a work-psychological perspective. *Creativity and Innovation Management, 15*(2), 164-172.

Scott, G., Leritz, L. E., & Mumford, M. D. (2004). The effectiveness of creativity training: A quantitative review. *Creativity Research Journal, 16*(4), 361-388.

Seddon, T. (2001). National curriculum in Australia? A matter of politics, powerful knowledge and the regulation of learning. *Pedagogy Culture and Society*, *9*(3), 307-331.

Seeley, K. (1984). Perspectives on Adolescent Giftedness and Delinquency. *Journal for the Education of the Gifted, 8*(1), 59-72.

Seeley, K. (2004). Gifted and Talented Students at Risk. *Focus on Exceptional Children, 37*(4), 1-8.

Sembiante, S. F., Dynia, J. M., Kaderavek, J. N., & Justice, L. M. (2018). Teachers' Literal and Inferential Talk in Early Childhood and Special Education Classrooms. *Early Education and Development, 29*(1), 14-30.

Shah, J., & Ali, B. (2012). Super-leadership: An approach to maximize idea generation and creative potential for creative culture. *African Journal of Business Management, 6*(1), 388.

Shavinina, L. V. (2007). On the advancement of the expert performance approach via a deep understanding of giftedness. *High Ability Studies*, *18*(1), 79-82.

Shavinina, L. V. (2013). *The Routledge International Handbook of Innovation Education*.

Shernoff, D. J., Kelly, S., Tonks, S. M., Anderson, B., Cavanagh, R. F., & Sinha, S. (2016). Student engagement as a function of environmental complexity in high school classrooms. *43*, 52-60.

Siegle, D., & McCoach, D. B. (2009). Issues related to the underachievement of gifted students. *Emergent Themes and Trends in Gifted Education*, 195-206.

Siegle, D., Rubenstein, L. D., & Mitchell, M. S. (2014). Honors students' perceptions of their high school experiences: The influence of teachers on student motivation. *Gifted Child Quarterly, 58*(1), 35-50.

Silvia, P. J., Christensen, A. P., & Cotter, K. N. (2016). Commentary: The Development of Creativity—Ability, Motivation, and Potential. *New Directions for Child and Adolescent Development, 2016*(151), 111-119. doi:10.1002/cad.20147

Silvia, P. J., Wigert, B., Reiter-Palmon, R., & Kaufman, J. C. (2012). Assessing creativity with self-report scales: A review and empirical evaluation. *Psychology of Aesthetics, Creativity, and the Arts, 6*(1), 19.

Silvia, P. J., Winterstein, B. P., Willse, J. T., Barona, C. M., Cram, J. T., Hess, K. I., & Richard, C. A. (2008). Assessing creativity with divergent thinking tasks: Exploring the reliability and validity of new subjective scoring methods. *Psychology of Aesthetics, Creativity, and the Arts, 2*(2), 68.

Simmons, W. K., Hamann, S. B., Harenski, C. L., Hu, X. P., & Barsalou, L. W. (2008). fMRI evidence for word association and situated simulation in conceptual processing. *Journal of Physiology-Paris, 102*(1-3), 106-119.

Simonton, D. K. (1990). History, chemistry, psychology, and genius: An intellectual autobiography of historiometry.

Simonton, D. K. (2012). Teaching Creativity Current Findings, Trends, and Controversies in the Psychology of Creativity. *Teaching of Psychology, 39*(3), 217-222.

Singer, J. L. (1966). Daydreaming: An introduction to the experimental study of inner experience.

Singh, U. (2006). Novelty and Meaning Contexts of Creativity as related to gf and gc. *Psychological Studies-University of Calicut, 51*(1), 52.

Skinner, E., Furrer, C., Marchand, G., & Kindermann, T. (2008). Engagement and disaffection in the classroom: Part of a larger motivational dynamic? *Journal of Educational Psychology, 100*(4), 765.

Skinner, E. A., Kindermann, T. A., & Furrer, C. J. (2009). A motivational perspective on engagement and disaffection: Conceptualization and assessment of children's behavioral and emotional participation in academic activities in the classroom. *Educational and Psychological Measurement, 69*(3), 493-525.

Slade, M. (2001). Listening to the Boys. The Boys in Schools Bulletin, 4, 10–18.

Sligh, A. C., Conners, F. A., & Roskos-Ewoldsen, B. J. (2005). Relation of creativity to fluid and crystallized intelligence. *39*(2), 123-136.

Smallwood, J., Brown, K., Baird, B., & Schooler, J. W. (2012). Cooperation between the default mode network and the frontal–parietal network in the production of an internal train of thought. *Brain research, 1428*, 60-70.

Smyth, J., & Hattam, R. (2004). *' Dropping Out,' Drifting Off, Being Excluded: Becoming Somebody Without School* (Vol. 22): Peter Lang.

Snow, P. & Powell, M. J. (2012). Youth (in) justice: Oral language competence in early life and risk for engagement in antisocial behaviour in adolescence. *435*, 1-6.

Snowling, M. J., & Hulme, C. J. (2012). Annual Research Review: The nature and classification of reading disorders–a commentary on proposals for DSM-5. *53*(5), 593-607.

Sointu, E. T., Savolainen, H., Lappalainen, K., & Lambert, M. C (2017). 'Longitudinal associations of student–teacher relationships and behavioural and emotional strengths on academic achievement.' *Educational Psychology* 37(4): 457-467.

Sousa, D. A. (2009). *How the gifted brain learns*: Sage.

Street, B. V., & Martin-Jones, M. (2000). *Literacy events and literacy practices: Theory and practice in the New Literacy Studies*.

Sternberg, R. (2012). The Assessment of Creativity: An Investment-Based Approach*,* 3.

Sternberg, R., & Jordan, J. (2005). *A handbook of wisdom: Psychological perspectives*: Cambridge University Press.

Sternberg, R. J. (1985). *Beyond IQ: A triarchic theory of human intelligence*: CUP Archive.

Sternberg, R. J. (1985). Implicit theories of intelligence, creativity, and wisdom. *Journal of personality and Social Psychology, 49*(3), 607.

Sternberg, R. J. (1990). Practical intelligence for success in school. *Educational Leadership, 48*(1), 35-39.

Sternberg, R. J. (1997). *Thinking styles / Robert J. Sternberg*: Cambridge, U.K. ; New York, NY, USA : Cambridge University Press, 1997.

Sternberg, R. J. (1998). Abilities are forms of developing expertise. *Educational researcher, 27*(3), 11-20.

Sternberg, R. J. (1999). The theory of successful intelligence. *Review of General Psychology, 3*(4), 292.

Sternberg, R. J. (2000). Identifying and developing creative giftedness. *Roeper Review, 23*(2), 60-64.

Sternberg, R. J. (2001). Giftedness as developing expertise: A theory of the interface between high abilities and achieved excellence. *High Ability Studies, 12*(2), 159-179.

Sternberg, R. J. (2003). *Wisdom, intelligence, and creativity synthesized*: Cambridge University Press.

Sternberg, R. J. (2004). Culture and intelligence. *American psychologist, 59*(5), 325.

Sternberg, R. J. (2004). Introduction to definitions and conceptions of giftedness. *Definitions and conceptions of giftedness*.

Sternberg, R. J. (2006). The nature of creativity. *Creativity Research Journal, 18*(1), 87-98.

Sternberg, R. J. (2010). WICS: A new model for school psychology. *School Psychology International, 31*(6), 599-616.

Sternberg, R. J. (2016). Creativity, Intelligence, and Culture. In *The Palgrave Handbook of Creativity and Culture Research* (pp. 77-99): Springer.

Sternberg, R. J., & Davidson, J. E. (2005). *Conceptions of giftedness*: Cambridge University Press.

Sternberg, R. J., Ferrari, M., Clinkenbeard, P., & Grigorenko, E. L. (1996). Identification, instruction, and assessment of gifted children: A construct validation of a triarchic model. *Gifted Child Quarterly, 40*(3), 129-137.

Sternberg, R. J., & Grigorenko, E. L. (2002). *Dynamic testing: The nature and measurement of learning potential*: Cambridge university press.

Sternberg, R. J., Grigorenko, E. L., Ferrari, M., & Clinkenbeard, P. (1999). A triarchic analysis of an aptitude-treatment interaction. *European Journal of Psychological Assessment, 15*(1), 3.

Sternberg, R. J., & Kaufman, J. C. (2010). The Cambridge handbook of creativity.

Sternberg, R. J., & Kaufman, J. C. (2010). Constraints on creativity. *The Cambridge handbook of creativity*, 467-482.

Sternberg, R. J., Kaufman, J. C., & Pretz, J. E. (2002). *The creativity conundrum: A propulsion model of kinds of creative contributions*: Psychology Press.

Sternberg, R. J., & Kaufman, S. B. (2011). The Cambridge handbook of intelligence.

Sternberg, R. J., & Lubart, T. I. (1991). An investment theory of creativity and its development.

Human development, 34(1), 1-31.

Sternberg, R. J., & Lubart, T. I. (1993). Creative giftedness: A multivariate investment approach. *Gifted Child Quarterly, 37*(1), 7-15.

Sternberg, R. J., & Lubart, T. I. (1995). *Defying the crowd: cultivating creativity in a culture of conformity*: New York, N.Y. Free Press.

Sternberg, R. J., & Lubart, T. I. J. A. p. (1996). Investing in creativity. *51*(7), 677.

Sternberg, R. J., Nokes, C., Geissler, P. W., Prince, R., Okatcha, F., Bundy, D. A., & Grigorenko, E. L. (2001). The relationship between academic and practical intelligence: A case study in Kenya. *Intelligence, 29*(5), 401-418

Sternberg, R. J., Reznitskaya, A., & Jarvin, L. (2007). Teaching for wisdom: What matters is not just what students know, but how they use it. *London Review of Education, 5*(2), 143-158.

Sternberg, R. J., & Williams, W. M. (1996). *How to develop student creativity*: ASCD.

Sternberg, R. J., & Zhang, L. (1995). What do we mean by giftedness? A pentagonal implicit theory. *Gifted Child Quarterly, 39*(2), 88-94.

Subotnik, R. F., Olszewski-Kubilius, P., & Worrell, F. C. (2011). Rethinking giftedness and gifted education: A proposed direction forward based on psychological science. Psychological science in the public interest, 12(1), 3-54.

Sullivan, A. M., Johnson, B., Owens, L., & Conway, R. (2014). *Punish Them or Engage Them? Teachers' Views of Unproductive Student Behaviours in the Classroom* (0313-5373). Retrieved from https://ezp.lib.unimelb.edu.au/login?url=https://search.ebscohost.com/login.aspx?direct=true&db=eric&AN=EJ1020605&site=eds-live&scope=site

Swain, N. R. (2017). *Speech-language pathology intervention for young offenders.* Retrieved

from http://hdl.handle.net/11343/198331

Swain, N. R., Eadie, P. A., Prior, M. R., Reilly, S. (2015). Assessing early communication skills at 12 months: a retrospective study of autism spectrum disorder. *50*(4), 488-498.

Swerdlow, N. R., Stephany, N., Wasserman, L. C., Talledo, J., Sharp, R., & Auerbach, P. P. (2003). Dopamine agonists disrupt visual latent inhibition in normal males using a within-subject paradigm. *Psychopharmacology, 169*(3-4), 314-320.

Tan, A. G., Li, J., & Rotgans, J. (2011). Creativity self-efficacy scale as a predictor for classroom behavior in a Chinese student context.

Tierney, P., & Farmer, S. M. (2002). Creative self-efficacy: Its potential antecedents and relationship to creative performance. *Academy of Management Journal, 45*(6), 1137-1148.

Tomlinson, C. A. (1999). Mapping a route toward differentiated instruction. *Educational Leadership, 57*, 12-17.

Tomlinson, C. A. (2017). *How to differentiate instruction in academically diverse classrooms*: ASCD.

Tomlinson, C. A., & Allan, S. D. (2000). *Leadership for differentiating schools and classrooms*: Ascd.

Torrance, E. P. (1962). Guiding creative.

Torrance, E. P. (1968). *Torrance tests of creative thinking*: Personnel Press, Incorporated.

Torrance, E. P. (1972). Predictive Validity of the Torrance Tests of Creative Thinking*. *The Journal of Creative Behavior, 6*(4), 236-262.

Torrance, E. P. (1998). *Torrance tests of creative thinking: Norms-technical manual: Figural (streamlined) forms A & B*: Scholastic Testing Service.

Treffinger, D. J., & Isaksen, S. G. (2005). Creative problem solving: The history, development, and implications for gifted education and development. *Gifted Child Quarterly, 49*(4), 342-353.

Treffinger, D. J., Young, G. C., Selby, E. C., & Shepardson, C. (2002). Assessing Creativity: A Guide for Educators. *National Research Center on the Gifted and Talented*.

Tsakanikos, E., Reed, P. J. P., & Differences, I. (2003). Visuo-spatial processing and dimensions of schizotypy: figure-ground segregation as a function of psychotic-like features. *35*(3), 703-712.

Turner, J. C., Oakes, P. J., Haslam, S. A., & McGarty, C. (1994). Self and collective: Cognition and social context. *Personality and social psychology bulletin, 20*, 454-454.

Turvey, M. T., Shaw, R. E., Reed, E. S., & Mace, W. M. (1981). Ecological laws of perceiving and acting: In reply to Fodor and Pylyshyn (1981). *Cognition*, *9*(3), 237-304.

Urban. K. (1991). On the development of creativity in children. *Creativity Research Journal, 4*(2), 177-191.

Urban. K. (2002). The general and special case: Development and nurturing of creativity. Keynote address at the 7th Asia-Pacific Conference on Giftedness, Bangkok, August 12-16.

Urban. K. (2003). Toward a componential model of creativity. In D. Ambrose, L. M. Cohen, & A. J. Tannenbaum (Eds.), *Creative intelligence: Toward theoretic integration.* (pp. 81-112). Cresskill, NJ, US: Hampton Press.

Urban, K. (2004). Assessing creativity: The test for creative thinking-drawing production (TCT-DP) the concept, application, evaluation, and international studies. *Psychology Science, 46*(3), 387-397.

Urban, K. (2014). From creativity to Responsible Createlligence®. *Gifted Education*

International, *30*(3), 237-247.

Valiente, C., Lemery-Chalfant, K., Swanson, J., & Reiser, M. J. (2008). Prediction of children's academic competence from their effortful control, relationships, and classroom participation. *100*(1), 67.

Van Kleeck, A., Vander Woude, J., & Hammett, L. (2006). Fostering literal and inferential language skills in Head Start preschoolers with language impairment using scripted book-sharing discussions. *American journal of speech-language pathology*.

van Uden, J. M., Ritzen, H., & Pieters, J. M. (2014). Engaging students: The role of teacher beliefs and interpersonal teacher behavior in fostering student engagement in vocational education. *Teaching and Teacher education, 37*, 21-32.

VanTassel-Baska, J. (2010). *Content-based curriculum for high-ability learners*. Sourcebooks, Inc..

VanTassel-Baska, J. (2018). Achievement Unlocked: Effective Curriculum Interventions with Low-Income Students. *Gifted Child Quarterly, 62*(1), 68-82. doi:10.1177/0016986217738565

VanTassel-Baska, J., Feng, A. X., & de Brux, E. (2007). A Study of Identification and Achievement Profiles of Performance Task-Identified Gifted Students over 6 Years. *Journal for the Education of the Gifted, 31*(1), 7-34.

Verschueren, K., & Koomen, H. M. (2012). Teacher–child relationships from an attachment perspective. *Attachment & human development*, *14*(3), 205-211.

Venables, P. H., & Rector, N. A. (2000). The content and structure of schizotypy: a study using confirmatory factor analysis. *26*(3), 587-602.

Victoria (2016). *Creative Victoria*: Creative industries, commerce and the creative economy: retrieved from https://creative.vic.gov.au/

Vladut, A., Liu, Q., Leana-Tascila, M. Z., Vialle, W., & Ziegler, A. (2013). A cross-cultural validation study of the Questionnaire of Educational and Learning Capital (QELC) in China, Germany and Turkey.

Vygotsky, L. S. (1980). *Mind in society: The development of higher psychological processes*: Harvard university press.

Walker, S., & Graham, L. (2019). At risk students and teacher-student relationships: student characteristics, attitudes to school and classroom climate. *J International Journal of Inclusive Education*, 1-18.

Wallas, G. (1926). *The art of thought.* J. Cape: London.

Wang, M. T., & Peck, S. C. (2013). Adolescent educational success and mental health vary across school engagement profiles. *Developmental psychology*, *49*(7), 1266.

Wang, C. K. J., Liu, W. C., Nie, Y., Chye, Y. L. S., Lim, B. S. C., Liem, G. A., & Chiu, C.-Y. (2017). Latent profile analysis of students' motivation and outcomes in mathematics: an organismic integration theory perspective. *3*(5), e00308.

Wang, M. T., & Degol, J. (2014). Staying engaged: Knowledge and research needs in student engagement. *8*(3), 137-143.

Wang, M. T., & Eccles, J. S. (2012). Social support matters: Longitudinal effects of social support on three dimensions of school engagement from middle to high school. *Child development, 83*(3), 877-895.

Wang, M.T., Chow, A., Hofkens, T., & Salmela-Aro, K. (2015). The trajectories of student emotional engagement and school burnout with academic and psychological development: Findings from Finnish adolescents. *Learning and Instruction, 36*, 57-65. https://doi.org/10.1016/j.learninstruc.2014.11.004

Wang, Q., Ceci, S. J., Williams, W. M., & Kopko, K. A. (2004). Culturally situated cognitive

competence: A functional framework. *Culture and competence. Contexts of life success*, 225-250.

Watt H. M, Carmichael, C., & Callingham, R., (2017). Classroom motivational environment influences on emotional and cognitive dimensions of student interest in mathematics. *ZDM*, *49*(3), 449-460.

Watters, J. J. (2010). Career decision making among gifted students: The mediation of teachers. *Gifted Child Quarterly, 54*(3), 222-238.

Weiner, R. (2000). Creativity & beyond : cultures, values, and change. State University of New York.

Weinlein, V. L. (2019). *Rural Teachers' Perceptions and Practices of Differentiation for Rural Gifted Learners.* Widener University, York Press.

Wellisch, M. (2016). Gagne's DMGT and underachievers: The need for an alternative inclusive gifted model. *Australasian Journal of Gifted Education*(1), 18. doi:10.21505/ajge.2016.0003

Westby, E. L., & Dawson, V. (1995). Creativity: Asset or burden in the classroom? *Creativity Research Journal, 8*(1), 1-10.

Whitfield-Gabrieli, S., & Ford, J. M. (2012). Default mode network activity and connectivity in psychopathology. *Annual review of clinical psychology, 8*, 49-76.

Wilson, R. C., Guilford, J. P., Christensen, P. R., & Lewis, D. J. (1954). A factor-analytic study of creative-thinking abilities. *Psychometrika*, *19*(4), 297-311.

Withagen, R., & van der Kamp, J. (2018). An ecological approach to creativity in making. *New Ideas in Psychology, 49*, 1-6. https://doi.org/10.1016/j.newideapsych.2017.11.002

Wolfradt, U. & J. E. Pretz (2001). 'Individual differences in creativity: Personality, story writing, and hobbies.' European Journal of Personality **15**(4): 297-310

Woodcock, R. W., & McArdle, J. J. (1998). *Human cognitive abilities in theory and practice*: L. Erlbaum.

Wright, S. B., Matlen, B. J., Baym, C. L., Ferrer, E., & Bunge, S. A. (2007). Neural Correlates of Fluid Reasoning in Children and Adults. *Frontiers in Human Neuroscience, 1*, 8. doi:10.3389/neuro.09.008.2007

Yang, H. L., & Cheng, H. H. (2009). Creative self-efficacy and its factors: An empirical study of information system analysts and programmers. *Computers in Human Behavior*, *25*(2), 429-438.

You, S., Furlong, M. J., Felix, E., Sharkey, J. D., Tanigawa, D., & Green, J. G. (2008). Relations among school connectedness, hope, life satisfaction, and bully victimization. *Psychology in the Schools, 45*(5), 446-460.

Young, A. R., Beitchman, J. H., Johnson, C., Douglas, L., Atkinson, L., & Escobar, M., (2002). Young adult academic outcomes in a longitudinal sample of early identified language impaired and control children. *43*(5), 635-645.

Yoruk, S., & Runco, M. (2014). The Neuroscience of Divergent Thinking. *ANS: The Journal for Neurocognitive Research, 56*(1-2).

Yuan, K., Steedle, J., Shavelson, R., Alonzo, A., & Oppezzo, M. J. (2006). Working memory, fluid intelligence, and science learning. *1*(2), 83-98.

Zabelina, D. L., & Robinson, M. D. (2010). Creativity as flexible cognitive control. *Psychology of Aesthetics, Creativity, and the Arts, 4*(3), 136.

Zeng, L., Proctor, R. W., & Salvendy, G. (2011). Can traditional divergent thinking tests be trusted in measuring and predicting real-world creativity? *Creativity Research Journal,*

23(1), 24-37.

Zentall, S. S., Kuester, D. A., & Craig, B. A. (2011). Social behavior in cooperative groups: Students at risk for ADHD and their peers. *The Journal of Educational Research, 104*(1), 28-41.

Zentall, S. S., Moon, S. M., Hall, A. M., & Grskovic, J. A. (2001). Learning and motivational characteristics of boys with AD/HD and/or giftedness. *Exceptional Children, 67*(4), 499-519.

Zhang, G., Chan, A., Zhong, J., & Yu, X. (2016). Creativity and social alienation: the costs of being creative. *International Journal of Human Resource Management, 27*(12), 1252-1276. doi:10.1080/09585192.2015.1072107

Zhang, L.F., & Sternberg, R. J. (2011). Revisiting the investment theory of creativity. *23*(3), 229-238.

Ziegler, A. (2005). *The Actiotope Model of Giftedness.* In R. J. Sternberg & J. E. Davidson (Eds.), *Conceptions of giftedness* (p. 411–436). Cambridge University Press. https://doi.org/10.1017/CBO9780511610455.024

Ziegler, A. (2007). Ericsson's three challenges of giftedness research. *High Ability Studies, 18*(1), 93-95.

Ziegler, A., & Baker, J. (2012). Gifted education from a systemic perspective: The importance of educational capital and learning capital for the development of actiotopes. *Development of excellence in East-Asia: Explorations in the actiotope model of giftedness. London, England: Routledge*.

Ziegler, A., Chandler, K. L., Vialle, W., & Stoeger, H. (2017). Exogenous and Endogenous Learning Resources in the Actiotope Model of Giftedness and Its Significance for Gifted Education. *Journal for the Education of the Gifted, 40*(4), 310-333.

doi:10.1177/0162353217734376

Ziegler, A., Debatin, T., & Stoeger, H. (2019). Learning resources and Talent development from a systemic point of view. In (Vol. 1445, pp. 39-51).

Ziegler, A., Fidelman, M., Reutlinger, M., Vialle, W., & Stoeger, H. (2010). Implicit personality theories on the modifiability and stability of the action repertoire as a meaningful framework for individual motivation: a cross-cultural study. *High Ability Studies, 21*(2), 147-163.

Ziegler, A., & Phillipson, S. N. (2012). Towards a systemic theory of gifted education. *High Ability Studies, 23*(1), 3-30.

Ziegler, A., & Stoeger, H. A learning oriented subjective action space as an indicator of giftedness.

Ziegler, A., & Stoeger, H. (2004). Identification based on ENTER within the conceptual frame of the actiotope model of giftedness. *Psychology Science, 46*(3), 324-341.

Ziegler, A., & Stoeger, H. (2008). A learning oriented subjective action space as an indicator of giftedness. *Psychology Science, 50*(2), 222.

Ziegler, A., & Stoeger, H. (2012). Shortcomings of the IQ-based construct of Underachievement. *Roeper Review, 34*(2), 123-132.

Ziegler, A., Stoeger, H., & Grassinger, R. (2011). Actiotope model and self-regulated learning. *Psychological Test and Assessment Modeling, 53*(1), 161-179.

Ziegler, A., Vialle, W., & Wimmer, B. (2013). The Actiotope Model of Giftedness: A short introduction to some central theoretical assumptions.

Zimmerman, B. J. (2000). Self-efficacy: An essential motive to learn. *Contemporary educational psychology*, *25*(1), 82-91.

Appendices

Appendix A

Plain Language Statements and Consent Forms

PLAIN LANGUAGE STATEMENT

Project: "Creative ability and students' beliefs about the classroom culture"

Introduction

We, David Camilleri and John Munro, are teachers from the University of Melbourne. We are studying how students think creatively and some of the factors that affect this. David plans to use the data as part of his PhD thesis at University with the assistance of his supervisors Dr John Munro and Dr John Quay. Your child's school has agreed to participate in the project. We would like to invite your child to be involved. The project has the approval of the Human Research Ethics Committee at The University of Melbourne.

What will your child be asked to do?

If you agree that your child can participate, they will be involved in paper-based tasks that ask them to use their vocabulary, to think about spatial patterns, to solve problems, and to think about how to use familiar objects. The tasks will not be used in any assessments by your child's teachers. Your child will be asked to say how well they can think creatively in classroom settings and to describe their attitudes and temperament. Your child will do most tasks in a group at their school. Also, some tasks will be carried out individually at their school. The total time your child will be taken out of class will not exceed 3 hours over 2 to 3 sessions throughout the year.

As well, your child may be interviewed briefly (included in the total time outlined above) on their own to find out more detail about their experiences in their classroom. The interview will be audio-recorded so that we can ensure we have an accurate record of what your child says.

How will my child's confidentiality be protected?

We will protect your child's anonymity and the confidentiality of their responses, within the limits of the law. Their name and the information from the tasks will be stored in password-protected computer files. We will remove any personal information that might identify your child. All children will be referred to by pseudonyms in any reports. The data will be kept securely in the Melbourne Graduate School of Education for five years before being destroyed.

Will participation prejudice my child in any way?

Your child's participation in this study is completely voluntary. Should you wish that they withdraw at any stage, or to withdraw any unprocessed data they have supplied, you and they are free to do so without prejudice.

Where can I get further information?

If you require any further information, or have any concerns, please do not hesitate to contact either of the researchers on the numbers given below. Should you have any concerns about the conduct of the project, you are welcome to contact the Executive Officer, Human Research Ethics, The University of Melbourne, on ph: 8344 2073, or fax: 9347 6739.

How do I agree for my child to participate?

If you would like your child to participate, please indicate that you have read and understood this information by signing the accompanying consent form and returning it to your child's teacher.

Dr. John Munro (Supervisor)
ph. 8344 0953
email: jkmunro@unimelb.edu.au

Mr. David Camilleri (PhD Student)
ph:0400048644
email: david.camilleri@unimelb.edu.au

PLAIN LANGUAGE STATEMENT FOR STUDENTS

"How do students' beliefs about the classroom culture influence creativity?"

Hello! My name is Dave Camilleri. I am a student at the University of Melbourne. I am doing a project to find out how people of your age show their creativity. When I finish my project it will be part of my degree, called a PhD. My supervisors, Dr John Munro and Dr John Quay, help me with my research project. We work in the Graduate School of Education.

Your school principal and your teacher have given me permission to send you this letter to tell you a bit about my research project. Once you have read the letter you can decide if you would like to take part. You should talk to your parents about the project too.

If you want to be part of the project, I would ask you to do a few tasks. Most of these tasks ask you to think in certain ways. You and the other people from your class who agree to take part will do the tasks in a regular classroom. Some students will also be invited to do a 30-minute interview with me about what they think about being creative in class. If you are chosen to do the interview, I will record what you say. I will explain about the different tasks and to answer any questions that you might have. If you don't know an answer, or you don't want to answer a question, that's fine and you can choose to stop being part of the project at any time.

The project has nothing to do with your school report or your grade for any of your subjects. I just want to see how different children show their creativity in class.

After the project is over, I will lock all the information I have collected away safely in the Graduate School of Education for 5 years. It is a University rule that I do this. After that my supervisor will destroy it.

Remember, you don't have to take part unless you want to. If you have any questions you should talk to your teacher or your parent. If they don't know the answer to your question, they can contact me, or my supervisor, or the Research Ethics Office at the University. If a question is intrusive or you feel uncomfortable giving an answer, then you may skip the question. Support is available for you if you feel negatively about your participation:
Kids Helpline - 1800 55 1800
Headspace online chat 7am – 1am: http://headspace.org.au/about-us/#online-help-at-eheadspace
Orygen Health: http://oyh.org.au/contact-us

If you want to be part of my project, and your parent/guardian agree, please sign your name on the next page where it says "student", and get your parent or guardian to sign as well.

Thanks for reading my letter.

Dave Camilleri

Dr. John Munro (Supervisor)
ph. 8344 0953
email: jkmunro@unimelb.edu.au

Mr David Camilleri (PhD Student)
ph:0400048644
email: david.camilleri@unimelb.edu.au

THE UNIVERSITY OF MELBOURNE

CONSENT FORM

PROJECT TITLE: Creative ability and students' beliefs about the classroom culture

Graduate School of Education, University of Melbourne

Dr John Munro and Dr John Quay from the Graduate School of Education, University of Melbourne, and Mr. David Camilleri are researching some of the factors, which can be used to understand creativity in secondary school students. Mr. Camilleri is planning to use the data as part of his PhD thesis at the Graduate School of Education, University of Melbourne.

We are studying how students think creatively and some ways to help students who are creative. This will include asking students to be creative but also asking them about their experiences at school relating to being creative.

I understand that:

- My child will be asked to complete a number of different tasks
- My child may be asked to conduct a 30-minute interview, which will be audio-recorded
- The tasks will be spread out across the 2016 school year
- My child's participation is voluntary
- The scores on the tasks will not be used in any assessments by my child's teacher or school
- My child will not be identified in any written material developed from the research project
- All tasks completed by my child and the scores they receive will get handled with the strictest confidence
- The researchers will provide support to participants during the process when needed
- All data will be destroyed after a minimum period of 5 years
- Once signed and returned the consent form will be retained by Dr John Munro and Mr. David Camilleri

I give permission for my child to be part of the research carried out by Dr John Munro and Mr. David Camilleri.

Name of student .....

Signature _____ Date _____

(Student participant)

Signature _____ Date _____

(Parent/Guardian)

Appendix B

Script for presentation to students

My name is David Camilleri. I am a PhD student from the University of Melbourne. I am a teacher and was once a high student also…

I was so excited to begin high school. No one knew I didn't have a pen licence. But, not having a pen licence turned out to be the least of my problems. When I think back to my school days, I mostly recall being told off for some reason or another. I ended up dropping out of school at the end of year 10.

Learning from my experiences as a teacher and student, I think that school can be more fun and enjoyable for both teachers and students. I believe that one way to do this is to include more creative thinking.

All people are creative and in many different ways. People can be creative when they spray graffiti or write poetry, when playing a game, on the footy field or on their computer; when getting dressed or fixing their bike, and some are creative when trying to get out of trouble…you get the point.

My PhD project will look at ways to help students improve their personal creativity.

Who here likes to be creative?
Great!
Do you think school could include more creative thinking?
Thanks for that!

We would like to assist students be more creative by understanding what teachers and schools can do to help. However, we cannot do this without students. Your school has agreed to help us with the project. Now we are asking for your help. We are asking you to share your knowledge with us.

We are looking for 160 students across Victoria to help us with the project. This is a chance for all of you to have a say…even if you think you are not creative, we think you have something important to say.

Any questions?

Please take the envelope home and discuss the project with your parents or guardians. If you would like to take part, please return the signed consent form and basic information sheet to your teacher within the next 3 weeks. They will return the envelope to me.

If you agree to help us, you will be asked to be creative but also to tell us you about your experiences at school. We want to learn more about 2 things

1. How students are creative: we will use classroom type activities and tasks
2. How teachers can help you be creative in your own way in the classroom

Thanks for listening

Appendix C

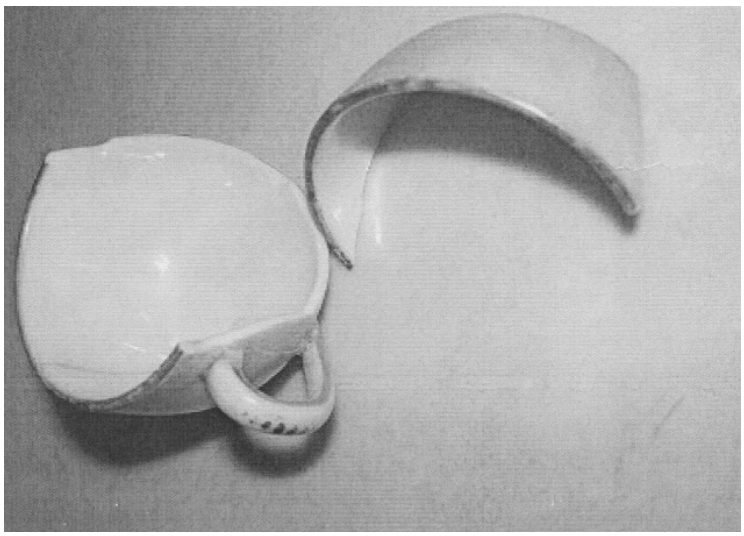
Social Problem-Solving Score Card

Question	Indicative behaviours	Scoring	Total
1. What would be the best way to get students buying more nutritious foods from the canteen?	Literal versus inferential thinking	1. **Literal** e.g. price, profit to school, & health only 2. **Near Inferential** mentions • price, profit to school, health • how it will be implemented e.g. adverts, bans 3. **Far Inferential** mentions • more than price & health e.g. deals, variety, reward • how it will be implemented e.g. social, economic	/3
	Complexity of solution: modifying other students' behaviour	1. **One-dimensional** – one idea 2. **Simple multi-dimensional** - two or more unrelated ideas 3. **Complex multi-dimensional** – two or more ideas integrated into novel approach	/3
	Mention of plausible ideas	**Quantity of plausible ideas**	
	Elaboration	**Quantity of words**	
5 What difficulties do you think you would face?	Amount of relevant ideas/fluency	**Quantity of relevant difficulties**	
	Complexity of expected difficulties	1. **One-dimensional** – one idea 2. **Simple multi-dimensional** - two or more unrelated ideas 3. **Complex multi-dimensional** – two or more ideas integrated into initial solution	/3
	Elaboration	**Quantity of words**	
6 What could you do to overcome these difficulties?	Number of relevant ideas/fluency	**Quantity of relevant solutions**	
	Complexity of solution to difficulties raised in question 2	1. **One-dimensional** – one idea 2. **Simple multi-dimensional** - two or more unrelated ideas 3. **Complex multi-dimensional** – two or more ideas integrated	/3
	Elaboration	**Quantity of words**	
7 How do you know your suggestion would work?	Complexity of reasoning –	1. **One-dimensional** – one idea 2. **Simple multi-dimensional** - two or more unrelated ideas 3. **Complex multi-dimensional** – two or more ideas integrated in solution	/3
	Plausible	**Quantity of plausible ideas**	
	Elaboration	**Quantity of words**	
5 Other than your school, who might be affected by your solution?	Number of categories of people/fluency	**Quantity of relevant groups**	
	Elaboration	**Quantity of words**	

Appendix D

Broken Cup Task

What happened to the cup?



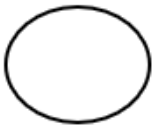
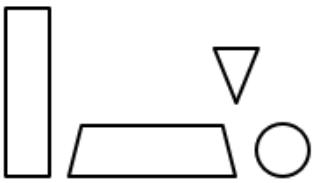
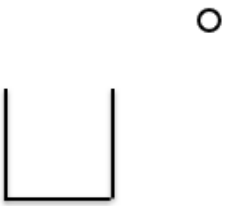
You have found this cup. Describe **how the cup might have come to be like this**. Please list all the different ways you can think of. We encourage you to write down **as many unusual and unexpected ways as you can**, **as well as more regular ways** :)

Appendix E

Figural Drawing Prompt (Shape Game) and Score Card

Task 4

The Shape Game: Use the shapes below to create a drawing. Read the instructions in the boxes on the left. We encourage you to **be as creative as you can!**

Instructions	Shapes to help you	Your Picture
Use this circle in a drawing		
Combine all the shapes into one drawing		
Complete a picture using these shapes		

Score Card for Shape Game

Name:			School:			
Level of Ability	***Not Yet Evident***	***Emerging***	***Expressing***	***Excelling***		
Points	*0 points*	*1 point*	*2 points*	*3 points*	Task	SubTot.
Modification: Unfaithfulness to original design	Replicated	Minimal Modification e.g. size	Medial Modification e.g. size & location	Highly Modified e.g. size & location barely reflects original	1	/3
					2	/3
					3	/3
Elaboration into Space: Any use of the space that occurs outside of the shape/s.	No elaboration into space	Small amount of space used	Most space is used	All space is used	1	/3
					2	/3
					3	/3
Continuations: Any continuation or extension of the stimulus shape/s	No Continuation	Minimal addition to stimulus	Medial Continuation	Continuation fully utilises stimulus shape/s	1	/3
					2	/3
					3	/3
Humour or Affectivity: Drawing prompts a humorous response, shows affection, emotional, or strong expressive power. Look for verbal and non-verbal cues e e.g. emotive words and figural actions that convey emotion. When assessing Humour, look for comical, funny, or amusing aspects in the drawing.	No humour/ emotion expression	Attempted humour/ emotional expression	Clear humour/ emotional expression	Complex and refined humour/ emotional expression	1	/3
					2	/3
					3	/3
Connections made to produce a theme/Storytelling: Drawing has produced a compositional theme or 'gestalt'. Discernible meaning has been produced. Synthesis of lines and objects into a coherent picture	No apparent meaning – sole object	Attempt has been made but theme unclear	Simple: Apparent and concrete but lacks detail or overarching coherence	Highly detailed and coherent theme or story e.g. depth, metaphor, meaningful.	1	/3
					2	/3
					3	/3
Movement or action: - title	No movement or action			Highly detailed actions or movements are	1	/3
					2	/3

- body posture - speech - change - transition		Action or movement is implied	Several action/s or movement/s are clear	present. Complex and dynamic	3	/3
Unusual Visualisation: Present objects from unusual visual perspective e.g. above, underneath, unusual angle, inside, different distances, unusual position or relationship	Usual Perspective (static, upright, straight-on-view)	Attempted Unusual Perspective	Basic Unusual Perspective	Highly detailed Unusual Perspective	1	/3
					2	/3
					3	/3
Fantasy: - Bends the rules of physics - Fantastical - Possible worlds-Imagination	No fantasy	Concrete and probable context – expected objects	Concrete and possible context – unexpected objects	Fantasy is Coherent. High detail in imagined world	1	/3
					2	/3
					3	/3
Richness of imagery: - Variety - Vividness - Liveliness - Intensity	No richness	Plain and uniform drawing	Varied and lively details	Varied, vivid, Lively, and Intense details	1	/3
					2	/3
					3	/3
Perspective: Any breaking away from two-dimensionality	No attempt	Attempt has been made	Realistic and simple three-dimensional representation	Realistic and complex three-dimensional representation	1	/3
					2	/3
					3	/3
New elements: Any new figure, symbol, or objects	No new elements	1 or 2 new elements	3 to 4 new elements	5 or more new elements	1	/3
					2	/3
					3	/3
					Raw Score	/99