

University of Denver

Digital Commons @ DU

---

Electronic Theses and Dissertations

Graduate Studies

---

1-1-2010

## An Exploratory Comparative Study of Students' Thinking in Arts Classrooms

Delane Ingalls Vanada  
*University of Denver*

Follow this and additional works at: <https://digitalcommons.du.edu/etd>



Part of the [Art and Design Commons](#), and the [Art Education Commons](#)

---

### Recommended Citation

Ingalls Vanada, Delane, "An Exploratory Comparative Study of Students' Thinking in Arts Classrooms" (2010). *Electronic Theses and Dissertations*. 830.  
<https://digitalcommons.du.edu/etd/830>

This Dissertation is brought to you for free and open access by the Graduate Studies at Digital Commons @ DU. It has been accepted for inclusion in Electronic Theses and Dissertations by an authorized administrator of Digital Commons @ DU. For more information, please contact [jennifer.cox@du.edu](mailto:jennifer.cox@du.edu), [dig-commons@du.edu](mailto:dig-commons@du.edu).

An Exploratory Comparative Study of Students' Thinking in Arts Classrooms

---

A Dissertation

Presented to

the Morgridge College of Education

University of Denver

---

In Partial Fulfillment

of the Requirements for the Degree

Doctor of Philosophy

---

by

Delane Ingalls Vanada

August 2010

Advisors: Kent Seidel, Ph.D. and Linda Brookhart, Pd.D.

©Copyright by Delane Ingalls Vanada 2010

All Rights Reserved

## **Abstract**

Author: Delane Ingalls Vanada

Title: An Exploratory Comparative Study of Students' Thinking in Arts Classrooms

Advisors: Kent Seidel, Ph.D. and Linda Brookhart, Ph.D.

Degree Date: August 2010

To be successfully intelligent in the 21<sup>st</sup> century, students must be able to think well in at least three ways: creatively, critically, and practically, with complexity and wisdom. The purpose of this research was to explore the differences in middle school students' quality of thinking in arts classrooms that are designed to be learner centered to a greater or lesser degree. Classroom environments which foster balanced intelligence in analytical, creative, and practical ways toward depth of understanding were the focus of this study. A better understanding of the impact of learner-centered environments on students' perceptions of their learning and understanding in these classrooms was also sought. This research study supported theory in the area of balanced intelligence, toward the realization of students' increased capacity to learn and achieve.

Results of this mixed model comparative study indicated that classrooms designed to be more learner-centered (utilizing inquiry, connection-making, and self-direction to a greater degree) had a positive effect on students' overall quality of thinking as demonstrated in a balanced way. Results also indicated that more learner-centered classrooms also had a positive effect on students' self-beliefs regarding their intelligence and understanding in the context of visual art.

This study suggests that infusion of best practice research toward the development of balanced thinking and overall cognitive development in the arts is beneficial to students and provided insight into the ways in which personal belief systems about

capabilities and intelligence drive motivation, which may in turn drive learning goals and overall achievement. The mixed model exploratory design led to an emerging theory regarding a systems approach to the development quality thinking, as driven by the learning and thinking culture, belief systems, and dynamic classroom environments. This study provides insight into how dynamic learning systems may better nurture the kind of flexible, adaptive thinkers—at all levels of the learning organization—needed in a complex world.

## **Acknowledgements**

To my family and friends who supported this work—first of all my children, who first inspired the goal and continue to teach me all that being “smart” entails;

To my parents who taught me how to not let adversity get in the way;

To my committee Chair, Dr. Kent Seidel, who believed in the value that this study could hold for students, the field of education, and the arts. A special thank you to my Co-Chair, Dr. Linda Brookhart, on whose wisdom and knowledge I could always count to guide me through the many facets of doctoral research. Dr. Brookhart, thank you for your patience and the encouragement you have provided me during this process;

To my University of Denver Ph.D. Cohort, with whom I have walked this journey and from whom I have learned so much about true leadership,

To my Lesley professors who encouraged my insatiable desire to learn, especially Dr. Mary Beth Cancienne who encouraged the pursuit of my Ph.D., and to colleagues across the globe who lent their assistance: Dr. Robert Sternberg, Dr. Elena Grigorenko, Dr. Robert Burden, Dr. Guy Claxton, and Dr. Diane Halpern;

To all who made a simple dream come true...

And especially to the late Libby Healy, who possessed the heart of a learner-centered teacher and who validated my love for learning, helped me to believe in myself, and taught me that learning is truly a life-long adventure.

## Table of Contents

|   |        |
|---|--------|
| Chapter 1—Introduction .....  | 1      |
| Purpose of the Study and Research Questions.....                      | 1      |
| Background.....   | 3      |
| Current Curricular Goals and Priorities .....                         | 4      |
| Balanced Intelligence and Art Education .....                         | 6      |
| Contemporary Thought Regarding Intelligence and Thinking Skills.....  | 7      |
| Balanced Thinking and Cognitive Science.....                          | 8      |
| The Affective Side of Thinking.....                                   | 9      |
| Definition of Terms.....  | 11     |
| <br>Chapter 2—Review of the Literature.....                           | <br>14 |
| Defining Thinking.....  | 15     |
| Aspects of Cognitive Science .....                                    | 17     |
| Neuroscience and Intelligence .....                                   | 18     |
| Brain Research and Art Education.....                                 | 19     |
| Theoretical Frameworks .....  | 21     |
| Successful Intelligence/Balanced Thinking Research .....              | 22     |
| New Theories of Intelligence.....                                     | 24     |
| Approaches to Developing Quality Thinkers .....                       | 26     |
| Dispositions Explained .....  | 26     |
| Dispositions Research.....  | 27     |
| Arts and Creativity in Schools .....                                  | 28     |
| Conceptual Frame: The Arts and Cognition .....                        | 29     |
| Critical and Creative Thinking.....                                   | 31     |
| Research on Critical Thinking .....                                   | 33     |
| Critical thinking and dispositions. ....                              | 35     |
| Critical thinking in the arts. ....                                   | 36     |
| Research Surrounding Creativity.....                                  | 37     |
| Creative thinking and dispositions.....                               | 40     |
| Practical Thinking and Intelligence .....                             | 41     |
| Dispositions in Art Education.....                                    | 42     |
| Balanced Thinking Skills in Art Education .....                       | 45     |
| Project zero and thinking. ....                                       | 48     |
| Design thinking as balanced intelligence.....                         | 50     |
| Best Practice Research and Learner-centered Instruction .....         | 52     |
| Art education and learner-centered practices.....                     | 53     |
| Theoretical Frameworks .....  | 55     |
| Producing Life-long Learners.....                                     | 57     |
| Student Agency, Self-efficacy, and Learner-Centered Classrooms.....   | 58     |
| Self-efficacy and motivation.....                                     | 59     |
| Performance Goals vs. Learning Goals .....                            | 60     |
| Constructivist Connection: Self-Directed Learning.....                | 61     |
| Self-Directed learning and creativity. ....                           | 63     |
| Constructivist Connection: Active Learning and Connection-making..... | 63     |

|   |     |
|---|-----|
| Active vs. passive learning.....  | 65  |
| Constructivism and the teacher’s role.....                                    | 65  |
| Connection-making in Art Education.....                                       | 66  |
| Arts integration: Inner tensions.....   | 68  |
| Connection-making and arts integration.....                                   | 69  |
| Learner-centered Environments and Inquiry.....                                | 71  |
| Socratic models of inquiry.....   | 72  |
| Inquiry-based cultures of learning.....                                       | 73  |
| Inquiry and learning in the arts.....   | 74  |
| Conclusion.....   | 75  |
| Chapter 3—Methods and Research Design.....                                    | 77  |
| Purpose and Significance of Study.....  | 78  |
| Choice and Purpose of Method.....   | 79  |
| Sampling Design.....  | 80  |
| Site Selection and Participants.....  | 82  |
| Data Collection Overview.....   | 83  |
| Levels of Data Collected.....   | 85  |
| Data Collection: Phase One.....   | 86  |
| Phase one: Follow-up observation.....   | 87  |
| Scoring procedures.....   | 90  |
| Process of rank ordering of classrooms.....                                   | 91  |
| Data Collection: Phase Two Matrix of Quality Thinking.....                    | 92  |
| The Assessment Matrix of Quality Thinking.....                                | 92  |
| Instrument Development and Rationales.....                                    | 95  |
| Matrix assessment 1: Critical thinking skills assessment (CTS).....           | 97  |
| Matrix assessment 2: Creative thinking skills assessment (CvTS).....          | 99  |
| Matrix assessment 3: Practical thinking skills (PTS).....                     | 100 |
| Matrix Tools for Critical, Creative, and Practical Thinking Dispositions..... | 102 |
| Matrix assessment 4: Critical thinking dispositions (CTD).....                | 102 |
| Matrix assessment 5: Creative thinking dispositions (CvTD).....               | 104 |
| Matrix assessment 6: Practical thinking dispositions.....                     | 105 |
| Matrix assessment 7: Overall quality thinking (OQO).....                      | 106 |
| Data Collection: Phase Three Survey (MALS).....                               | 111 |
| Data Collection Timeframe.....  | 113 |
| Data Analysis.....  | 114 |
| Phase one: QUAL + QUAN data analysis.....                                     | 115 |
| Phase two: QUAN data analysis.....  | 116 |
| Summary of Methods.....   | 116 |
| Chapter 4—Presentation and Analysis of Data.....                              | 117 |
| Phase One Data Analysis.....  | 118 |
| Phase Two Data Analysis.....  | 118 |
| Research Questions 1 and 2.....   | 120 |
| Findings: Research question one.....  | 120 |
| Individual and Matched Pair Results.....                                      | 123 |



|   |     |
|---|-----|
| Student Level Correlations .....                              | 125 |
| Research Question One: Reporting QUAL Data .....              | 126 |
| Across-School Themes .....                                    | 129 |
| Findings: Research question two. ....                         | 132 |
| Limitations of the Study.....                                 | 132 |
| Summary of Findings.....                                      | 133 |
| Summary of findings: Research question one. ....              | 133 |
| Summary of findings: Research question two. ....              | 135 |
| Chapter 5—Discussion .....                                    | 136 |
| Discussion of Findings: Research Question One.....            | 137 |
| Discussion of Findings: Qualitative Data .....                | 139 |
| The quality thinking systems theory. ....                     | 141 |
| Data-informed tool development. ....                          | 143 |
| Discussion of Findings: Research Question Two.....            | 146 |
| Significance: Research Question One.....                      | 147 |
| Implications for 21 <sup>st</sup> Century Best Practice ..... | 149 |
| Implications for Art Education .....                          | 150 |
| Significance: Research Question Two.....                      | 151 |
| Recommendations for Further Research.....                     | 152 |
| Summary.....  | 155 |
| References.....   | 157 |
| Appendix A.....   | 177 |
| Appendix B.....   | 179 |
| Appendix C.....   | 182 |
| Appendix D.....   | 183 |
| Appendix E.....   | 188 |
| Appendix F.....   | 189 |
| Appendix G.....   | 190 |
| Appendix H.....   | 191 |
| Appendix I.....   | 192 |

## List of Tables

|   |     |
|---|-----|
| Table 1 <i>Data Types by Level</i> .....  | 85  |
| Table 2 <i>Indicators for Learner-Centered Instruction</i> .....                              | 86  |
| Table 3 <i>Quality Thinking Assessment Matrix</i> .....                                       | 96  |
| Table 4 <i>Timeframe of Assessment Matrix and Sub-tests</i> .....                             | 114 |
| Table 5 <i>Correlations of Total Scores with Rank and Rank Scores</i> .....                   | 121 |
| Table 6 <i>Pearson Correlation Coefficients: Matrix Assessments with Total Scores</i> .....   | 122 |
| Table 7 <i>Correlation of Rank with OQO (Overall Quality Thinking Observation)</i> .....      | 123 |
| Table 8 <i>Correlations Between Pairs of Matrix Assessments</i> .....                         | 124 |
| Table 9 <i>Correlation of Student Age with Matrix Assessments</i> .....                       | 125 |
| Table 10 <i>Correlation of Matrix Assessments with Total Scaled Score (student level)</i> ... | 126 |
| Table 11 <i>Correlations: MALS with Rank, Learner-Centered Scores and Totals</i> .....        | 132 |

## List of Figures

|  |     |
|--|-----|
| Figure 1. Balanced Learning Environments .....                                 | 2   |
| Figure 2. Review of the Literature .....                                       | 15  |
| Figure 3. Three Phases of Sequential Mixed-Model Research Data Collection..... | 84  |
| Figure 4. Cognitive Complexity Levels and Strands .....                        | 108 |
| Figure 5. Rank Orders of Classes .....   | 118 |
| Figure 6. Quality Thinking Assessment Matrix.....                              | 120 |
| Figure 7. Alignment of Total Scores with Class Rank .....                      | 122 |
| Figure 8. OQO Data (0-3 scale).....  | 123 |
| Figure 9. Recoded Data with Research Base .....                                | 127 |
| Figure 10. QUAL Data: Themes and Evidence .....                                | 129 |
| Figure 11. Themes Observed Across All Schools .....                            | 131 |
| Figure 12. Quality Thinking Systems Model.....                                 | 141 |

## **Chapter 1—Introduction**

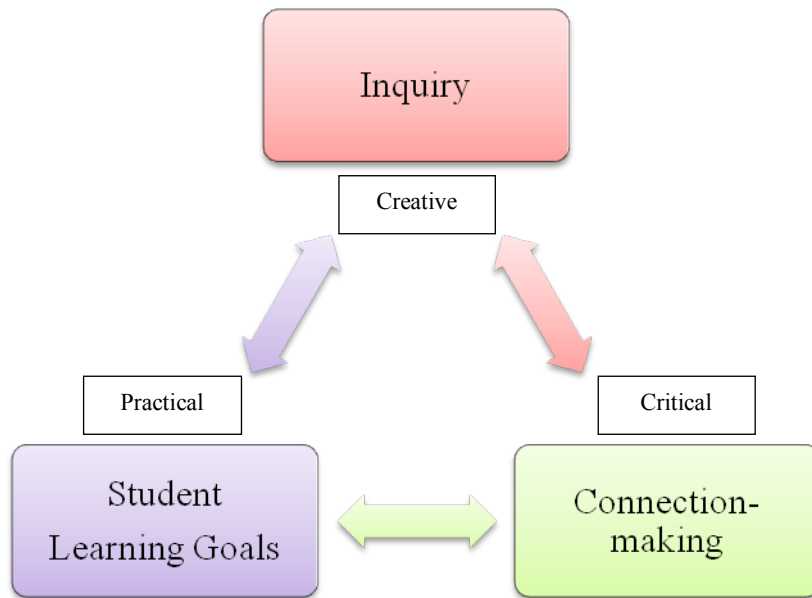
### **Purpose of the Study and Research Questions**

To be successfully intelligent in the 21<sup>st</sup> century, students must be able to think well in at least three ways: creatively, critically, and practically (Sternberg, 2008; Sternberg & Grigorenko, 2004), and to use their knowledge with wisdom (Craft, 2006, Sternberg, 2001). It is more common to hear about the importance of developing critical thinking skills in education, but less common to hear about the importance of developing a balance of thinking skills. For years, researchers have suggested a focal shift in schools from teaching quantities of knowledge to qualities of thinking (Mednick, 1999). Learning environments which foster active inquiry, deep understanding, creative and insightful solutions to problems and deeper engagement have been found to affect students' thinking qualities (Caine & Caine, 1997; Claxton, 2006a; Collins & Stevens, 1982; Sternberg, 2008; Tsui, 2002) and are a focus of this study. This inquiry is directed by two research questions:

1. Is there a difference in students' quality of thinking skills in classrooms that are designed to foster inquiry, connection-making, and self-directed learning and those that are less so?
2. How do students perceive their intelligence and understanding of a subject in these classrooms?

The purpose of this research is to investigate the difference in middle school students' quality of thinking in arts classrooms that are designed to be learner-centered to

a greater or lesser degree. Classroom environments which foster balanced intelligence in analytical, creative, and practical ways (Sternberg, 2008), and incorporate best practice research toward greater capacity to learn (Claxton, 2007; Bransford et al., 2000) are explored in this study. “Quality thinking,” or the ability to think in balanced, complex ways that lead to depth of understanding, frames this research study. Also called “successful intelligence,” this theoretical frame provides support for assessing quality thinking as a balance of critical, creative, and practical thinking skills and dispositions (Sternberg & Grigorenko, 2004). Classrooms which employ inquiry, connection-making, and self-directed learning align with the theory of balanced intelligence (as indicated in Figure 1) and are used to define learner-centered classroom practices for this study.



*Figure 1. Balanced Learning Environments*

Learner-centered classrooms are considered for their affect on training for creative, critical, and practical 21<sup>st</sup> century thinkers and problem solvers as well as their affect on students’ perceptions of their learning. A better understanding of the impact of

learner-centered practices on students' perceptions of their intelligence, learning ability, and understanding are sought as displayed by self-efficacy, confidence, and desire to learn. The degree to which teaching practices or environments are designed for balance may provide insight into the ways in which personal belief systems about capabilities and intelligence drive motivation, which may in turn drive learning goals and overall achievement. Explorations into students' beliefs about their learning and corresponding relationships of effort and ability (Resnick & Hall, 2000) are an area of interest for this study, and a needed area for continued research in the arts as predictors of student achievement.

The research presented in this chapter will address the need for new paradigms of intelligence based on new learning theories and the cognitive sciences. It places the development of more balanced thinking approaches in education in line with 21<sup>st</sup> century curricular needs. The historical impact of education policies that promoted an imbalance of thinking skills will also be explored. The literature review will serve to illuminate the complexity of learning, the brain, and the corresponding synthesis between cognition, knowledge, and creativity. The research informing this study will also provide an alternative framework for balanced thinking and intelligence.

## **Background**

This study sheds light on art classrooms that develop quality, balanced thinking in the arts. Twenty-first century life demands flexible abilities and habits of mind: creative thinking, problem solving, and making sense of vast amounts of information (Costa, 2006; LeMetais, 2003, Moseley et al., 2005). Today's students must develop the "intellectual tools and learning strategies" (Bransford et al., 2000, p. 6) needed for

thinking critically and creatively in an information-rich and complex world (Robinson, 2001). In this global economy, we cannot afford to not value the creative and innovative capabilities of our children (Robinson, 2001; Smithrim & Upitis, 2005). Mednick (1999) surveyed teachers in 31 countries concerning the abilities and characteristics necessary for youth to meet the challenges of the 21<sup>st</sup> century, finding that independent thought, creativity, innovation, and collaboration were most valued. He asserted that societies are dependent, as never before, on developing the intellectual, creative, and practical capabilities of our young and that education systems must shift away from being closed systems to being more open systems that are dynamic and adaptable in order to train for these skills.

Likewise, today's students must be able to think for themselves and be "self-initiating, self-modifying, and self-directing;" they must go beyond basic content knowledge and problem solving toward more insightful, creative, and others-centered solutions (Costa, 2006, p. 62). For this to happen there must be a recognized need for learning environments that value deep, critical, and creative thinking as an essential part of the process of learning and understanding (Lipman, 2003; Perkins, 2005). The effects of this type of learning environment on students' qualities of thought are a focus of this study.

### **Current Curricular Goals and Priorities**

Since the release of the infamous *A Nation at Risk* report by the National Commission on Excellence in Education (1983) and *Goals 2000* (Education Goals Panel, 1991), U.S. students have been found lacking in their higher-order thinking skills. Following these reports' claims, a curricular trend toward the teaching of *thinking skills*

ensued, primarily in the form of formal logic (SCANS, 1991). Yet years of narrow focus on curricula intended to mend the problem have perpetuated imbalances in testing and learning compared to other competing nations (Darling-Hammond, 2008). Mandated standards-based testing has led to a desensitization of the need for balanced intelligence (Gardner, 2007; Robinson, 2001), as well as which subjects best develop it. Eisner (2002) has blamed political and corporate agendas for defining the types of thinking that are currently tested and valued. He believes that this has led to a narrow definition of what constitutes academic achievement.

Meanwhile, curricular and assessment priorities in U.S. schools remain on memorization and analytic skills, rather than on the development of a balance of thinking skills (Robinson, 2001; Sternberg, 1999a, 2000). As the saying goes, “what gets tested, gets respected” (Wiggins, 1993, p. 5). In that case, the respected few are subjects focusing on analytic and memory-based skills (Sternberg, 2008), and we can assume that other subjects, including the arts, are less respected. Paradoxically, the goal of educating people who can think productively, creatively, and wisely, is put at odds with an educational system that values a narrower view of intelligence and schooling (Gardner, 2007). “Schools should play a critical role in the development of the intellect” (Erickson, 2006, p. 14), but current antiquated conceptions of intelligence or IQ overlook the total intellectual capabilities and capacities of students (Dai & Sternberg, 2004; Resnick, 1999; Robinson, 2001; Sternberg, 2008).

The research of Sternberg and colleagues (Sternberg, 1997; Sternberg & Grigorenko, 2004) has shown that when teachers modify their teaching to accommodate students’ balance of intelligences—analytical, creative, and practical—more students



experience academic achievement gains (Sternberg, 2008; Sternberg & Grigorenko, 2000; Sternberg, Torff, & Grigorenko, 1998a, 1998b). Students taught in a balanced way outperform students who are taught in ways that emphasize memory or analytical thinking alone. These findings held true for students in both multiple-choice and performance demonstrations of students' understanding.

While curricular goals in education have not focused on the building of quality and balanced thinking, an additional concern related to this research study is that the arts are often overlooked as equals in training for successful intelligence. To this are added the disagreements within the field of art education regarding the role of thinking.

### **Balanced Intelligence and Art Education**

Deeply entrenched assumptions exist about intelligence, perhaps stemming from 16<sup>th</sup> and 17<sup>th</sup> century Enlightenment ideals of deductive reason and scientific logic (Ritchhart, 2002; Robinson, 2001). These ideals have influenced attitudes toward intelligence and shaped values and priorities in education, placing creativity at the opposite end of the scale from knowledge, and therefore intelligence—a paradigmatic tension that exists to this day (Weisberg, 1999). Within the field of art education, this “tension view” paradigm also dichotomizes knowledge with creativity: intelligence on one side, and creativity on the other (Cunliffe, 2007, p. 2). Consequently, art teachers do not agree on the degree to which art education is an intelligent act or a creative act. Balance is lacking.

Research in the area of a balanced approach to critical, creative, and practical thinking in the arts is limited and needed. Research studies have rarely focused on the bonds between creative and critical thinking in education (Cunliffe, 2007; Glassner &

Schwarz, 2006), and even less research exists on the development of a balance of creative, critical, and social/emotional thinking skills in the visual arts.

Research points to the possibility that the outcomes of arts education more readily equip our youth for life in the 21<sup>st</sup> century than the current focus acknowledges. A new emphasis is needed in both education and art education that focuses on improving cognitive, emotional, and social development, which in turn affects students' overall capacities to learn (Claxton, 2007). A knowledge-rich education in art and design which balances creativity with criticality and self-discipline, self-direction, and personal skills may serve as a model for needed curricular changes in art curricula (Burnette, 2005; Burnette & Norman, 1997). The integrated and synergistic properties of critical and creative thought (Paul & Elder, 2006) in the arts must be recognized. In order to investigate quality thinking, this research looks at creativity as a cognitive and generative ability necessary for balanced intelligence (Sternberg, 2003a), which works best in tandem with critical thinking (King, 2004; Paul & Elder, 2006) and is tempered by practical and emotional intelligence (Goleman, 1996; Sternberg & Grigorenko, 2004).

### **Contemporary Thought Regarding Intelligence and Thinking Skills**

People display intelligence in a variety of ways (Gardner, 1983), yet the United States educational system values a narrow conception of intelligence or how it is acquired. Common views of intelligence are evidenced in academic subjects that are chosen as indicators of intelligence in state accountability testing, grade and class placement procedures, and curricular recommendations for schools. In this way, public policy affirms “institutionalized expressions of a persistent belief in the importance of inherited aptitude” (Resnick, 1999, p. 1). The present study investigates intelligence as an

expandable, integrated whole in which the critical and creative are inseparable (Paul & Elder, 2006) and skills work together with dispositions to assure quality thinking. Quality thinking equally involves aspects of one's attitudes, motivations, commitments, and habits of mind together with cognitive ability (Costa, 2006; Perkins & Ritchhart, 2004).

Expanded ways of thinking about intelligence may hold the key to educational transformation (Gardner, 2007; Robinson, 2001) but require letting go of former, limited beliefs. New and expanded theories of how people learn promote the need for developing flexible, adaptive thinkers who are also part of dynamic learning systems (Argyris & Schön, 1996; Fullan, 2001; Senge, 1990). Peter Senge, author of *The Fifth Discipline* (1990) says, "As the world becomes more inter-connected, organizations that will truly excel in the future will be (those)... that discover how to tap people's commitment and capacity to learn at all levels in an organization" (p. 4). Senge believes that the healthy functioning of our learning communities depends on the development of each person's overall potential. Robinson (2001) claims a primary function of education is to promote students' rainbow of intellectual capacities.

### **Balanced Thinking and Cognitive Science**

Research reveals new insights into the complexity of learning, the brain, and the complementary synthesis between cognition, knowledge, and creativity. The research on learning and the brain provides a framework for developing balanced thinking. Brain research supports the belief that the arts allow for learning in a way that brings deeper meaning to life, heightens development of the whole person, allows deeper engagement in the process, and supports a life-long love of learning. Cognitive research has indicated that deep engagement experienced by art students strengthens specific attention networks

in the brain, leading to greater transferability of learning (Posner, Rothbart, Sheese & Kieras, 2008).

How students learn, how the brain learns, and the role of agency and self-efficacy in learning call for changes in teaching and learning environments (Bransford et al., 2000; Resnick, 1999). Balanced thinking research (Sternberg & Grigorenko, 2004; Sternberg et al., 1998), coupled with expanded conceptions of intelligence (Bransford et al., 2000; Gardner, 2007; Resnick, 1999; Resnick & Hall, 2000) reflect a new way of thinking about learning that could transform teaching and learning. To this end, Fullan (2001, p. 269) has called for a “radically new way of approaching learning,” and in the arts, Hetland and Winner (2004) have called for more rigorous and “sophisticated methodologies” regarding the affects of teaching on how well students can use what they learn flexibly and appropriately (p. 47).

Art and design classrooms that encourage inquiry, self-directed learning, and connection-making and their subsequent affect on students’ qualities of thinking serve as an epistemological framework for this research. Constructivist models of teaching and learning that emphasize active involvement, problem solving, curiosity, and meaningful connection-making which lead to deep thinking and understanding are sought (Bransford et al., 2000; Perkins, 1998; Wiggins & McTighe, 2005).

### **The Affective Side of Thinking**

The connection between beliefs and learning are a vital part of understanding intelligence as a complex system, explained best by the connections between neuroscience and psychological and behavioral science. Cognitive research has shown that the emotional-motivational aspects of human behavior account for a large part of the

success or failure of our students' quality of thinking (Bransford et al., 2000; Bruner, 1994; Gardner, 1985; Resnick, 1999), revealing the regulatory impact of emotion and motivation on thinking (Damasio, 2001). Dai & Sternberg (2004) believe that an integrative definition of the study of intelligence places emotional and motivational impacts on learning at a higher priority; sole emphasis on cognitive capacity, structures, and processes is too narrow a view.

A close interplay exists between emotions and cognitive aspects of learning, such as decision making and reusing one's knowledge in new contexts. Immordino-Yang and Damasio (2007) emphasized the important role of affect on students' quality of thinking. They underscored the "critical role of emotion in bringing previously acquired knowledge to inform real-world decision making;" they also reported that "emotional processes are required for the skills and knowledge acquired in school to transfer to novel situations and real life" (p. 5). In this way, emotions are a critical force and play a regulatory role in students' understanding and ability to use their thinking in future contexts.

Students' perceptions of their abilities are critical components of motivation and behavior (Stipek, 2002). Their belief systems greatly affect their effort, emotional reactions to challenge, and persistence in the face of setbacks (Dweck, 1999). Students' perceptions of their competence are correlated with their performance in schools (Elliott & Dweck, 2005) as their "theories in action" are engaged (Argyris & Schön, 1996). Schools are social systems that greatly affect students' self-efficacy and agency (Bandura, 1989), and they greatly affect students' conceptions of their intelligence, capacity to learn, and improvement of skills.

In the next chapter a review of literature clarifies connections between the research questions and theoretical foundations as derived from six primary sources: (1) research regarding a balance of critical, creative, and practical thinking and dispositions, (2) research in art education as it applies to the development of thinking and dispositions, (3) best practice research as it applies to inquiry-based, constructivist, and connectivist classrooms, (4) the role of dispositions in quality thinking, (5) research in intelligence/ cognitive science, and (6) the mediating role of belief systems and affective aspects of learning on quality thinking. While controversies exist over what constitutes intelligence as well as which subjects develop it, an understanding of how art education fits into the development of higher quality thinking begins with a big picture view. The arts are considered for their ability to provide engaging and motivational entry points into deeper engagement (Posner et al., 2008) and a more balanced view of intelligence.

### **Definition of Terms**

**Arts Education:** An approach to teaching and learning that fuses the fine and creative arts as primary pathways to learning (visual art, music, dance, theater, poetry, etc.). Arts integration differs from traditional arts education by its inclusion of both an arts discipline and a traditional subject as part of learning.

**Attentional networks:** The complex neural circuitry in the brain comprised of 1) executive control, orienting, and alerting. Attentional networks serve as regulators of capacity and task performance. They serve as a bridge between the brain, cognition, and complexity.

**Balanced intelligence:** A theory which contends that intelligent behavior arises from a balance between analytical, creative and practical abilities, and that these abilities function collectively to allow individuals to achieve success (1997, 1999). To be successful in life the people must capitalize on their analytical, creative and practical strengths, while at the same time compensating for weaknesses in any of these areas. Intelligence is considered expandable and adaptable.

**Big Ideas:** Big ideas focus on concepts surrounding broad, important human issues that provoke meaningful thinking or ideas of personal or cultural meaning. Big ideas are often

characterized by complexity, ambiguity, and contradiction (Walker, 2001). Inquiries into big ideas also lead to interdisciplinary investigations that encompass more than facts and technique; they raise more questions, activate new thought and creativity, and lead to deeper understanding.

**Balanced Thinking:** The use of a balance of critical (analytical), creative, and practical thinking.

**Cognition:** The mental faculty of knowing, which includes perceiving, recognizing, conceiving, judging, reasoning, and imagining.

**Creative Thinking:** Thinking which produces invention, discovery, meaning-making, and other creative endeavors.

**Critical Thinking:** Analytical abilities enable the individual to evaluate, analyze, compare and contrast information.

**Depth of knowledge (DOK):** A measurement of the degree to which student knowledge elicited from students on assessments is as complex as what students are expected to know and do compared to a standard. It measures the complexity of the task, rather than its difficulty (Webb, 2005).

**Design thinking:** A cross disciplinary creative problem-solving process which combines higher-level thinking skills, knowledge of the visual arts, creative thinking, and practical skills.

**Dispositions:** A collection of cognitive tendencies, habits, behaviors, or attitudes that drive one's patterns of thinking. Dispositions concern not only what one can do, one's abilities, but also what one is disposed to do; they address the gap between abilities and actions (Ritchhart, 2001, p. 3) .

**Emotional intelligence:** The awareness of and ability to assess and manage one's emotions in a healthy and productive manner.

**Habits of mind:** Thinking dispositions designed to help people develop their critical, creative, and practical thinking skills.

**Intelligence:** The cognitive ability to learn from experience, to reason well, to remember important information, and to cope with the demands of daily living (Sternberg, 2008). A balanced view of intelligence suggests that it consists of complimentary processes of critical, creative, and practical thinking.

**Learning Power:** A complex mix of dispositions, lived experiences, social relations, values, attitudes, and beliefs that unite to shape the nature of an individual's engagement with any particular learning opportunity.

Neurobiological: The study of the nervous system as it applies to intellectual behavior, cognition, emotion, and physiological responses.

Practical thinking: Practical abilities enable an individual to understand what needs to be done in a specific setting using tacit information and knowledge and apply what they have learned in the appropriate setting.

Primary trait analysis (PTA): A method of assessing the quality of a given task or assignments involving the identification of specific criteria to distinguish high-quality work from poor-quality work. Develops clear descriptions of expectations for each achievement level.

Quality Thinking: Quality thinking is defined as a balance of critical, creative, and practical thinking skills and dispositions, used with complexity as held to a standard, and leading to depth of understanding.

Successful intelligence: The ability to achieve success in life, given one's personal standards, and within one's sociocultural context. Achieving successful intelligence depends on capitalizing on one's strengths and correcting or compensating for one's weaknesses through a balance of analytical, creative, and practical abilities (intelligences) in order to adapt, shape, and select environment (Sternberg, 2001).

Thinking: An "internal, mental process which constructs and operates on mental representations of information" (Moseley et al., 2005, p. 15). The term "thinking" may be used to describe many different dimensions, but particularly in education, and for this research, it is used to explain conscious and goal-directed processes, such as recall, forming new concepts, planning what to do and say, imagining, reasoning, solving problems, considering other point of view, making decisions and judgments, and generating new ideas.

Traditional or classical conception of intelligence: Intelligence as an inherited, fixed, and measurable entity

Transfer: The act of connecting what we learn or what we know to other settings and contexts.

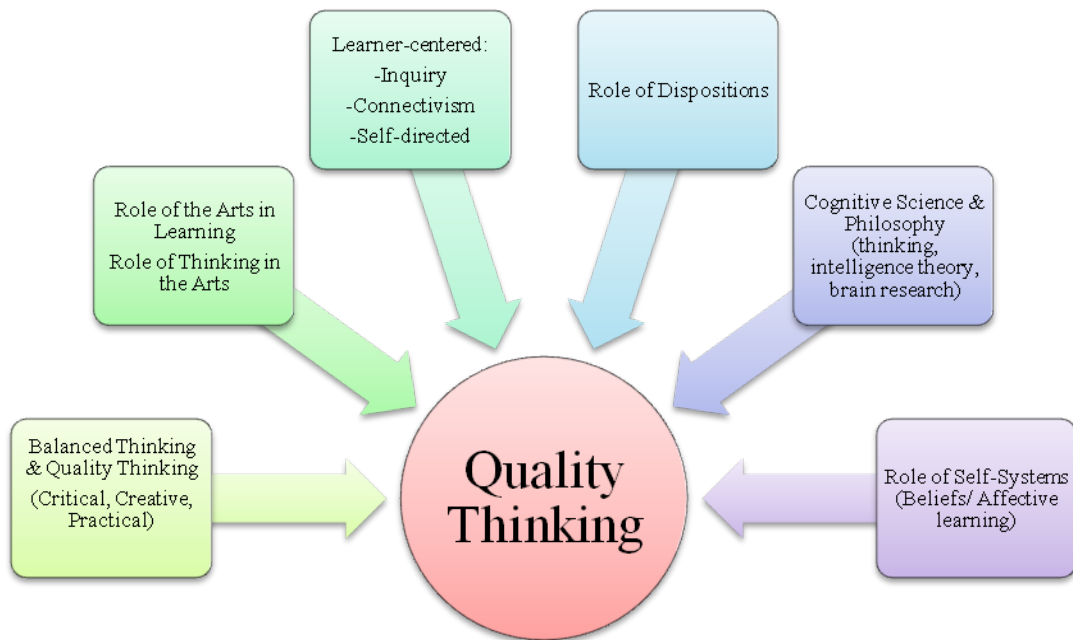
Whole-brained: Research-based concept of learning and thinking based on the brain as a complex, interactive, adaptive system, in which the various parts of the brain function as a whole (rather than separate left-brain and right-brain activity). Neuroimaging and other advances in technology have informed this research.



## **Chapter 2—Review of the Literature**

American students have not been found to be strong in the areas of thinking and reasoning on a national and international level (Education Goals Panel, 1991; Resnick, 1987; Sayers, 1947). In the 2006 Program in International Student Assessment tests (PISA), United States students scored low on problem solving, placing 35<sup>th</sup> in math and 31<sup>st</sup> in science out of 40 countries (Bransford et al., 2000; Darling-Hammond, 2008). An analysis of higher achieving countries (Finland, Australia, New Zealand, Japan, Korea, Canada) showed that those countries place educational priorities on reasoning skills, the development of deep learning (versus coverage), critical thinking, and problem solving. Several countries ranking higher in achievement are also those who previously adopted platforms including more balanced views of intelligence and new theories of learning, as well as training for creative and innovative thinking (LeMetais, 2003; QCA, 2009). Additionally, the countries of England, Scotland, and Australia have promoted national education platforms that include teaching for creativity and training for problem solving, teamwork, and cultural competency (CEA, 2008; LeMetais, 2008; LTS, 2008; Moga et al., 1999, NCA, 2008; Partnership, 2005; QCA, 2009). Most recently, the United Kingdom has adopted a national “Personal, Learning, and Thinking Skills” framework which identifies independent inquiry, creative thinking and critical thinking, reflective learning, collaboration, and self-directed learning as the key qualities and skills needed for success in learning and life. This balanced approach to the development of quality

thinking in education serves as global example and jumping off point toward understanding the many facets of cognition and quality thinking. The sources investigated in the following review of the literature represent the multi-faceted nature of this study. Figure 2 represents the six primary sources of research and literature that connect theoretical and conceptual foundations to the present inquiry.



*Figure 2. Review of the Literature*

### **Defining Thinking**

The term “thinking” can be used in many senses: as semi-conscious or conscious thought, imagination, or deliberate acts of concentration or reflection. Due to the nature of the study of thinking, its various processes, and in the case of the present study—its quality, it is acknowledged that the terminology used can often be complex and confusing. The author has provided a list of terms at the end of Chapter One to aid the reader. For this research study, thinking is considered an “internal, mental process which

constructs and operates on mental representations of information” (Moseley et al., 2005, p. 15). The term “thinking” can be used to describe many different dimensions, but particularly in education, it is usually used to explain conscious and goal-directed processes, such as “remembering, forming concepts, planning what to do and say, imagining situations, reasoning, solving problems, considering opinions, making decision and judgments, and generating new perspectives” (Moseley et al., 2005). In evaluating thinking, several academic traditions have played a part. The fields of philosophy, psychology, sociology have provided insight, and more recently neuroscience and neurophysiology have begun to have an impact. Attempting to understand how people think and the quality to which they think is a difficult task, “since we can only try to understand these things by using the very processes that we do not fully understand” (Moseley et al., 2005, p. 10).

Various conceptions of thinking can be identified by two main categories: descriptive and normative (Moseley et al., 2005). Descriptive definitions of thinking originate from psychological roots, involving cognitive skills and mental processes that require mental procedures such as classifying, inferring, and evaluating. This view implies that thinking skills can be developed through step by step procedures. Normative definitions stem from a philosophical view, adopting a general quality of thinking connected with one’s values; it is often defined as “good thinking.” Neither academic traditions have influenced the frameworks for and descriptions of thinking as significantly as have the cognitive sciences in recent years.

## Aspects of Cognitive Science

Cognitive science includes both the study of neurobiological functions (brain research as applied to thinking and learning) as well as the psychological and behavioral functions (mental and behavioral functions of thinking and learning) (Dai & Sternberg, 2004). Studies of human thinking and decision making in recent years have resulted in theories that thinking is more integrated than early research proposed (Bransford et al., 2000; Facione, Sanchez, Facione & Gainen, 2000). Perkins (1995) believes that intelligence includes the various processes and expressions of cognition, transfer, intelligence, and memory. His normative view of learning includes the (a) active use of knowledge, (b) understanding of knowledge, and (c) retention of knowledge. One's ability for learning, one's capacity, encompasses all of these processes. Researchers have refuted the notion that intelligence is associated with one's IQ score, or that it is fixed at birth (Resnick & Nelson-LeGall, 1997; Caine & Caine, 1997). Nor has it been found to correlate with class, gender, national origin, or race (Sternberg, 2008). This undercuts statistics cited in the controversial book, *The Bell Curve*, in which the authors suggested that ethnic differences affected IQ (Murray & Herrnstein, 1994).

Richard Snow (1992) is credited for his work in expanding the notion of "aptitude" from a purely cognitive ability toward inclusion of motivational, affective, and self-reflective characteristics. Bruner (1994) claimed that emotion and cognition could not be separated, and Dai & Sternberg's research (2004, p. 28) led to conclusions that "without taking into consideration the motivational and emotional aspects of intellectual functioning and development, we cannot even properly understand cognitive processes."

Dai and Sternberg (2004) argued that intelligence is never a purely cognitive event, but must involve motivation and emotion; they further asserted that an education which does not take into account these personal factors is an incomplete education. Other research indicated that students' capacities to learn have as much to do with their beliefs about the relation between effort and ability and their motivations to learn (Damasio, 1998; Dweck, 1999; Resnick, 1999).

### **Neuroscience and Intelligence**

On the side of neurobiological function, intelligence is now found to be a complex process which involves the whole person: body, mind, and emotion. Brain researchers report on the interplay of senses, emotions, movement, and the physical environment in the development of intelligence (Caine & Caine, 1997; Damasio, 1998; Sylwester, 2003). Current brain-based education (Jensen, 2008) recognizes that learning is a complex blend of all the levels of organization of the nervous system (Damasio, 2001; Immordino-Yang & Damasio, 2007), and movements in the intersection of neuroscience and cognitive science have influenced teaching and learning practices (Caine & Caine, 1994; Jensen, 2001; Gardner, 1999; Ritchart, 2002; Sylwester, 2003; Wolfe, 2001).

Integrative definitions of intelligence, enhanced by neuroscience and the psychological and behavioral functions of cognitive science have increased the importance of studying the regulatory impact of emotion and motivation on thinking (Dai & Sternberg, 2004; Damasio, 2001). Motivation and affective domains drive attention, perceptions, cognition, and memory (Bransford et al., 2000; Dweck, 1999; 2006; Resnick, 1999), and thus thinking. Carol Dweck (1999; 2006) has described that there are

two primary goal orientations which affect motivation: performance goals (those where the attention is focused on the self) and learning goals (where the attention is focused on the task). Goal orientations together with the person's implicit or explicit purpose for taking on the task determine their "mindset" (Dweck, 2006, p. 6). Damasio's research (1998) revealed that the brain learns best when connected to emotion, which creates deeper learning and the development of creative imagination. These findings have been expanded by Posner and colleagues (2008) in their work involving how sustained and focused learning in the arts motivates the same key attention networks in the brain, leading to improved overall thinking.

### **Brain Research and Art Education**

Learning in the arts develops both the emotional and cognitive brain (Jensen, 2001, 2008), although the means by which the arts may support cognitive growth in students is relatively undocumented (DeMoss & Morris, 2002). Brain imaging has revealed that right/left brain thinking should be replaced by the knowledge that all of the brain is activated in all arts processes. Neuroimaging studies have shown that learning in the arts develops and utilizes the whole brain, more than some sciences (Jensen, 2001). The arts can no longer be known as only "right-brained"; they require whole-brained intelligence. Other research findings with implications for qualities of thinking and this study include:

- The physiological brain changes due to its neuroplasticity; it has the ability to build new neurons, rewire and remap itself (Kempermann, Wiskott & Gage, 2004).

- The learning environment fosters or hinders deep learning (Caine & Caine, 1994; Csikszentmihalyi, 1990)
- The capacity for memory is strengthened in learning environments that foster deep learning and deep understanding (Caine & Caine, 1994, 1997; Jensen, 2001; Csikszentmihalyi, 1990).

In 2008, the Dana Foundation Consortium (Dana, 2008) answered the call for further research into how the “possibility that sustained and deep learning in the arts may cultivate habits of mind and dispositions impacting future problem-solving behavior” (p. 157). In 2008, the Dana Foundation released the results of “Learning, Arts, and the Brain,” a three-year study involving cognitive neuroscientists from seven leading United States universities on the impact of arts learning on cognition. In seeking to find out if smart people are drawn to the arts or if arts training makes people smarter, the results tightened longstanding correlations between arts training and improved cognition (Gazzaniga, 2008).

Of particular interest to this research study are findings by University of Oregon researchers (Posner et al., 2008) who theorized that children interested in an art form, are motivated to practice it with focused attention. The three-year, multi-modal study provided further evidence that the efficiency of key attention networks in the brain were improved through sustained attention in the arts (Gazzaniga, 2008; Posner et al., 2008). Through neuroimaging, brain activity in the anterior cingulate cortex (ACC) was enhanced during arts-related tasks that demand high attentional control, showing that motivation leads to sustained attention, which leads to greater efficiency in the brain’s

attention networks. This, in turn, improves general cognitive capacity and transference to other cognitive skills. Posner's research added to his former findings (1994) regarding the anterior cingulate cortex (ACC) and its mediating role over thought and behavior.

Another informative Dana Foundation study conducted by Stanford University researchers (Wandell et al., 2008) reported that music training positively correlated with improved reading fluency, sequencing, and phonological awareness. Visual arts training showed weak correlations with phonological awareness but was found to correlate more strongly with improvements in children's math calculation abilities.

### **Theoretical Frameworks**

Theoretical frameworks for the importance of thinking and intelligence begin with John Dewey's ideas on interest and reflection (1933). His idea that knowledge was activated by one's desire and "will," which worked together to produce a balance of thinking that promoted thoughtfulness in the learner. It was Dewey's belief (1933) that the primary end of education was the development of reflective thought in order to enable students to ultimately take responsibility for their own thinking and actions, toward the goal of effectual participation in a democratic society. Developmental psychologists, Piaget (1952) and Bruner (1966), focused on cognitive and intellectual development. Piaget's work (1952) highlighted the child's active construction of knowledge toward building personal interpretations of experiences, while Bruner (1966) utilized intervention approaches to cognitive development. Social intelligence (Gardner, 1983; Goleman, 1996) and socio-cultural theorists of intelligence (Vygotsky, 1978) brought to the forefront the powerful role of social constructs in supporting and increasing students'



cognitive development (Resnick, 1999, Resnick & Hall, 2005). Perkins (1995) identified three dimensions of intelligence: neural, experiential, and reflective—the latter two of which are learnable. His work showed that experiential intelligence can be expanded by in-depth experiences and reflective intelligence through a cultivation of dispositions, strategies, and metacognition (Perkins, 1995; Tishman & Perkins, 1997). Theoretical frameworks of learnable intelligence (Gardner, 1993; Perkins, 1995; Resnick, 1999; Resnick & Hall, 2005) inform this study, and primary research for this study is found in the research into successful intelligence.

### **Successful Intelligence/Balanced Thinking Research**

Research into the area of intelligent behavior led Dr. Robert Sternberg and colleagues (Sternberg & Grigorenko, 2004; Sternberg et al., 1998) to a theory of “successful intelligence” which asserted that the application of a balance of analytical, creative, and practical thinking and dispositions allows people to be more successful in life and learning. Analytical thinking involves analyzing, comparing/contrasting, evaluating, explaining, solving problems; creative thinking involves creating, designing, imagining, finding new solutions; practical thinking involves applying new knowledge in real life situations (including knowledge learned tacitly) in ethical ways, as well as social skills. Woven together, these abilities and dispositions apply a unique pattern of skills and attitudes for each individual (Sternberg, 1997, 2008). It is not enough to memorize and analyze ideas; the successful intelligence theory says that students also need creative abilities to generate good ideas, and the practical and positive social skills to persuade others of their value and successfully implement them. Successful intelligence

frameworks represent the knowing, understanding, and doing that constitutes balanced intelligence.

Sternberg's theory affirmed the modifiable and expandable realms of learning (Resnick, 1999). It refuted theories by scholars who have believed that excellence and racial diversity are incompatible (Murray & Herrnstein, 1994). Sternberg (2004) claimed that not only must modes of ability testing be changed; current assessments must emphasize a radically more balanced view of intelligence to include analytical, creative, and practical intelligences. His research revealed that many students "actually have abilities that, under traditional systems of testing and instruction, remain hidden and ultimately go to waste" (Sternberg, 1999b, p. 5). By not teaching and testing for balanced intelligence, says Sternberg, social inequities are created in that tested skills are the ones in which children from middle and upper classes excel, on average. Not only do schools test for the wrong intelligences, the ones which are tested do not matter most for success in life (Darling-Hammond, 2008; Sternberg, 2008; Sternberg & Grigorenko, 2004).

A central feature of balanced intelligence is adaptability within the individual and the individual's social context when people learn to capitalize on strengths and strengthen their weaknesses in any of the three areas (Sternberg, 2008). In this theory, successful intelligence is viewed as modifiable. Abilities are not fixed; they are flexible. Students who believe their abilities are expandable will achieve success because they are willing to risk and engage in challenging tasks that lead to achievement (Dweck, 1999; Resnick, 2005).

Other researchers have advocated for more balanced approaches to intelligence and thinking. Howard Gardner's *Five Minds for the Future* (2007) addressed the importance of cultivating the capacities needed for success in an interconnected world. Gardner (2007) identified the need for fostering students' "disciplined," "respectful," "creating," and "ethical" intelligences, as well as their "synthesizing" mind for taking disparate content and integrating it into a coherent whole (p. 3). Gardner (2007) promoted the concept that creativity is enhanced by the inclusion of boundaries, balanced by a convergence of connection-making (synthesizing) and practical (disciplined) disciplines. He called this kind of thinking, "conceptual agility" (p. 33). Costa (2006) has advocated for the preparation of well-rounded citizens who are "informed, skilled, and compassionate," value "truth, openness, creativity, interdependence, balance, and love" as well as the spirit (p. 62). Similarly, Lipman's model (2003) of balanced intelligence included critical, creative, and caring thinking.

### **New Theories of Intelligence**

Dr. Lauren Resnick (1999), director of the Learning Research and Development Center at the University of Pittsburgh, prompted new theories of intelligence. Resnick and Hall (1997) claimed that "children become smart by being treated as if they already were intelligent," which led to the development of "principles of learning" that embraced students' effort toward expanding their intelligence (p. 107).

An expandable view of intelligence has challenged the traditional bell-curve model (Murray & Herrnstein, 1994), with its claim that intelligence was largely based on IQ and a fixed conception of learning capacity, decided at birth. Resnick (1999) grounded

the “all can learn” rhetoric with research that correlated a rigorous, challenging, “thinking curriculum” with students’ increased reasoning and problem solving (p. 39). Students normally lacking in test-taking ability showed specific gains in higher-level thinking and active use of their knowledge when academic rigor and challenging tasks were introduced (Resnick & Hall, 2000). Resnick’s report (1999) refuted arguments that certain children “lack the talent for high-level thinking,” and affirmed that high levels of achievement can be experienced by all students through a balance of quality engagement and motivation (p. 38).

Resnick’s principles of learning (2005) inform and frame this research in regards to beliefs about student intelligence and the kinds of knowledge-based constructivist learning environments that foster cognitive development and understanding for all students. Resnick says:

Children develop cognitive strategies and effort-based beliefs about intelligence—the habits of mind associated with higher-order learning—when they are continuously pressed to raise questions and accept challenges, to find solutions that are not immediately apparent, to explain concepts, justify their reasoning, and seek information.

When we do not hold children accountable for this kind of intelligent behavior, they take it as a signal that we do not think they are smart, and they often come to accept this judgment (p. 106).

A thinking-rich curriculum supports the idea that quality thinking depends on a solid foundation of knowledge, and knowledge cannot be taught without engaging students in productive thinking (Bransford et al., 2000). Critical and creative thinking must be made visible in this way (Tishman & Palmer, 2006).

## **Approaches to Developing Quality Thinkers**

Research in intelligence has led to the development of identifiable characteristics of quality thinkers (Costa, 2001; Ennis, 1996; Paul & Elder, 2006; Sternberg, 2001).

Although there is disagreement as to the effectiveness of various approaches to improving thinking, the main approaches are: (1) the teaching of thinking/skills approach, (2) the teaching for thinking/dispositions approach, and (3) the teaching with thinking or understanding approach (Harpaz, 2007). Skills approaches or infusion approaches to thinking conform more to the traditional or classical conception of intelligence compared to theories which recognize the expandable capacities of intelligence (Gardner, 1983; Harpaz, 2007; Perkins, 2005; Sternberg, 1997, 2008).

## **Dispositions Explained**

Quality thinking involves more than just an accumulation of knowledge and skills. Resnick (1999) has stated that intelligence is really the “sum of one’s habits of mind” (p. 38), lending support to theory that intellect is expandable, not fixed. What differentiates high-quality thinking from average thinking is not just the ability to think well, but also the engagement of specific dispositions (Perkins & Ritchhart, 2004; Ritchhart, 2004).

To Claxton (2007), the development of inner dispositions helps students maintain long-term, transformed habits of learning instead of short-term gains realized by thinking techniques applied to the outside. Perkins and colleagues (2000) have described learning dispositions as “relatively stable traits that help to explain intellectual performance over and above measures of intellectual aptitude” (p. 269). The following conditions are

necessary for tapping into dispositions: (1) ability: the capability to think effectively, (2) inclination: the willingness to invest effort in thinking), and (3) sensitivity to context: noticing occasions that call for thinking (Perkins et al., 1993).

### **Dispositions Research**

*“To be playful and serious at the same time is possible, and it defines the ideal mental condition.” - John Dewey (1933)*

Disposition theories are not new. Dewey (1933) wrote about the balanced attitudes of open-mindedness, whole-heartedness, and responsibility necessary to thinking. More recently, psychologist Ellen Langer (1993) advanced the view that high-level thinking is characterized by a single overarching thinking disposition of mindfulness. Mindful thinkers, says Langer, operate in broad alertness to the world, move beyond set classifications, are open to new information, and consider multiple perspectives. Claxton and Carr (2004) linked mindfulness to creativity and playfulness—a perceptual openness where students are “ready, willing, and able” (p. 89) to engage in problem solving. Likewise, Gardner said that “open-mindedness, flexibility, willingness to trust hunches, and curiosity are factors that emerge repeatedly as facilitating and favoring creativity” (1993, p. 382).

Peter and Noreen Facione (1992), primary authors of the California Critical Thinking Dispositions Inventory (CCTDI), defined thinking dispositions as a constellation of attitudes, intellectual virtues, and habits of mind (Facione, Sanchez, Facione & Gainen, 2000). The CCTDI is theoretically derived from the description of the ideal critical thinker articulated by the American Philosophical Association sponsored Delphi Project (APA, 1997); it named the dispositions of truth-seeking, open-

mindedness, analyticity, organization, critical reasoning confidence, inquisitiveness, and maturity of judgment. Open-mindedness was defined as tolerance for new ideas and divergent views. Although not called dispositions, Goleman's list (1996, p. 93) of seven key ingredients for the emotional intelligent capacities for knowing how to learn, included the dispositions of confidence, curiosity, intentionality, self-control, relatedness, communication, and cooperation.

### **Arts and Creativity in Schools**

Creativity is infrequently emphasized in schools. The tendency is to concentrate on analytical skills and memorization (Sternberg, 2003a). Dr. Ken Robinson (2001), a former Minister of Education in the United Kingdom and author of *Out of our Minds: Learning to be Creative*, believes that traditional education systems are not designed to value creativity. Instead, says Robinson, schools train students out of creativity. The arts are often considered less intellectual than science, mathematics, and technology (Cunliffe, 2007; Robinson, 2001; Sahasrabudhe, 2006).

At the same time, there has been much discussion about the essential role of creativity for 21<sup>st</sup> century life coupled with the fundamental cognitive abilities needed in a global economy (Florida, 2003; Gullatt, 2007, Paul & Elder, 2006; Ruppert, 2006). Daniel Pink (2005) claimed that it is necessary to the future success of our young to educate for creative, analytical, big picture thinkers. Innovation and empathy are the skills and dispositions that Pink claimed will matter most in the future. Mednick's research (1999) revealed that teachers perceived the need for independent, creative, innovative and collaborative 21<sup>st</sup> century thinkers.

The Secretary's Commission on Achieving Necessary Skills (SCANS) found that high performance workplaces required critical thinking competencies such as creative thinking, decision making, problem solving, and reasoning (SCANS, 1991). The application of a balance of critical, creative, and practical skills is essential for success in life and work in a global economy (Sternberg, 2008). Perspectives on arts-making that combine process and product together with a balance of critical, creative, and practical thinking may come closer to this aim (Sternberg & Lubart, 1999).

### **Conceptual Frame: The Arts and Cognition**

John Dewey (1934) identified and supported a positive correlation between the aesthetic and the intellectual. Dewey (1934) described thinking in terms of qualities, or qualia, as one of the most sophisticated modes of cognition. "To think effectively in terms of relations of qualities is as severe a demand upon thought as to think in terms of symbols, verbal and mathematical" (p. 46). Within the field of art education, however, the shift toward recognition of the role of cognition in art making has been gradual (Sahasrabudhe, 2006).

Researchers in cognitive science and neuroscience understand the arts as fully integrated, whole-brained systems that enhance teaching and learning (Jensen, 2001; Gazzaniga, 2008, Posner et al., 2008). Efland's theory of imaginative cognition (2004) described the thinking involved in creating and understanding works of art. He defined the importance of mental imagery, connection-making, and the role of visual and verbal metaphor in the development of higher-order thinking and understanding. Efland believed that "education should have as its ultimate purpose the maximization of the



cognitive potential of individuals, and this includes the use of the imagination—in all subjects to be sure, but certainly in the arts” (2004, p. 770).

Cognitive processing research in art education has been conducted in the areas of basic cognition and memory (Eisner, 1994, 1998, 2002), critical thinking (Burton, Horowitz & Abeles, 2000; Lampert, 2006; Luftig, 2000), development of creative thinking (Csikszentmihalyi, 1990, 1993; Luftig, 1994), and learnable intelligence (Gardner, 1995; Perkins, 1995). Arts education has been found to increase ones’ capacity to understand another person’s point of view and to make connections within and across disciplines (i.e., transfer) (Bransford et al., 2000; Burton et al., 2000; Catterall, 2002; Marshall, 2006; Moga, Burger, Hetland, & Winner, 1999). The subject of transferability, however, remains controversial.

Transfer of thinking and understanding from the arts to other subjects is believed to be more successful in activities that engage higher-order cognition such as, reflection, critical thinking, creative thinking, and the ability to tolerate ambiguity (Hetland & Winner, 2004; Perkins, 2001; Posner, 2008; Tishman, MacGillivray, & Palmer, 2002). With pressure to raise test scores (Chapman, 2004; Eisner, 2002), some researchers have focused on the connections between arts and academic achievement and transfer of skills (Catterall, 2002).

Others have argued against validating art education for ancillary outcomes such as increased academic achievement, as overall results have been inconclusive (Eisner, 1998; Winner & Hetland, 2000b). However, unsolved mysteries remain as to how arts training increases SAT Reasoning scores (Vaughn & Winner, 2002). Still others have called for

arts researchers to move beyond the arts versus academics arguments, toward what education can and should be for all students (Seidel, 2001).

### **Critical and Creative Thinking**

The relationship between critical and creative thinking has been commonly misunderstood (Bailin, Case, Coombs & Daniels, 1999; Paul & Elder, 2006). Some view creativity as related but independent of cognition (Runco, 1990) while others disagree and say that intelligence and creativity are not mutually exclusive from each other (Bailin et al., 1999, Paul & Elder, 2006; Sternberg, 2001, 2003). Moreover, a tension exists that corresponds with the split between Enlightenment reason and Romantic creativity at the end of the 18<sup>th</sup> century leading to an undermining of the association of intelligence with the arts (Robinson, 2001, Weisberg, 1999). This split is what Cunliffe (2007) claimed may have led to a gradual erosion of knowledge-rich practices in the arts.

The opposition between creative thinking and critical thinking may have been complicated in that the goal of creative thinking has been considered as the creative product, and the goal of critical thinking has been considered as evaluation (Perkins, 1990). Whatever the cause, critical and creative thinking are often positioned at opposite poles. Critical thinking is thought of as analytic, convergent, objective, and linear; creative thinking is considered generative, divergent, subjective, and related to aesthetics (Glassner & Schwarz, 2006; Robinson, 2001). Refuting this notion, Paul and Elder (2006) claimed that critical and creative thinking operate in tandem, that they cannot be separated. Further, they claimed that all excellent thinking combines these two dimensions of thought. Paul and Elder (2006) articulated that the definition of “creative”

implies a critical component and that there is shared logic in both intellectual creation and critical judgment.

To Paul (1993), high-quality thought involves parallel processes of producing and assessing, both imagination and intellectual principles:

Critical thinkers must be creative thinkers as well, generating possible solutions in order to find the best one. Very often a problem persists, not because we can't tell which available solution is best but because the best solution has not yet been made available—no one has thought it up yet. Therefore, although critical thinkers use all available information relevant to their problems, including the results of solutions others have used in similar situations, they are flexible and imaginative, willing to try any good idea whether it has been done before or not (p. 16).

Clearly, sound thinking should include both creative and analytical standards (Paul & Elder, 2006). Both artistic performances and scientific discoveries require exercises of judgment—decisions based on critical thought (Paul & Elder, 2006). Creativity has an important role in critical thinking when imagination or alternative perspectives are needed, just as self-critique and critical evaluation play an important role in creative thinking (Bailin et al., 1999). Tishman and Perkins (1997) with Sternberg (1999a) expanded on the synergy between creativity and criticality, noting that critical reasoning has a significant and valid role in art making (both in the process and in judgments of aesthetics and quality), while creative thought and imagination have a significant and valid role in critical scholarship. The relationship between critical thinking and creativity has led other researchers to consider the important connections between cognitive, affective, and motivational domains (Bailin et al., 1993).

For this study, quality thinking involves a synthesis of creative and critical thought, plus the real-world sensibility of practical thinking. Quality thinking must also

be held to a standard in order to be of quality (Bailin et al., 1999; Ennis, 1996; Webb, 2005). In art and design, this quality of thinking is often evidenced through synthetic processes (Gardner, 2007), sustained effort (Posner, 2005), and “performances of understanding” (Perkins, 2005), as students analyze their work in terms of practicality, innovation, and quality (Hokanson, 2007).

### **Research on Critical Thinking**

No one definition can cover all dimensions of critical thinking (Bailin et al., 1999); thus, a combination of definitions should avoid limitations of both. Lampert (2006) defined critical thinking as recognizing differing viewpoints, being analytically reflective and willing to increase sources of information, as well as generating meaningful questions to formulate plausible conclusions. Lampert’s research looked at critical thinking as being focused on evaluating issues or problems with more than one possible interpretation or solution. This is similar to Halpern’s definition (1996) which agreed that critical thinking is purposeful, reasoned, and goal-directed, and Bailin’s (1999), which said that critical thinking must be “directed toward some end or purpose” (p. 2).

Halpern argued that when people think critically, they are evaluating the outcomes of their thought processes—how good a decision is or how well a problem is solved, and the reasoning that went into the arrived-upon conclusion. In real life, critical thinking skills are needed whenever people wrestle with complex issues and make decisions about messy, complex problems (Halpern, 2006). Critical thinking skills are

often referred to as higher-order cognitive skills to differentiate them from less complex thinking skills.

Higher-order skills are relatively complex; they require judgment, analysis, and synthesis, and are not applied in a rote or mechanical manner. Higher-order thinking is thinking that is reflective, responsive to the context, and self-monitored (Halpern, 2006). Webb (2005) asserted that high-order thinking show complexity and must be held to a standard which is relevant to both the end product and the process in a given area of inquiry.

Ennis (1996, p. 166) defined critical thinking as a “reasonable and reflective thinking focused on deciding what to believe or do,” although Bailin and colleagues reminded that “not just any thinking aimed at deciding what to believe or do can count as critical thinking” (1999, p. 287). Critical thinking involves thinking through problematic situations about what to believe or how to act with intention, and it involves making reasoned judgments that exemplify the attributes of a quality thinker (Bailin et al., 1993). For Lipman (2003), critical and creative thinking are necessary for higher-order thinking and guided by truth and meaning, respectively, toward the goal of good judgment. Critical thinking is self-correcting and sensitive to context (Lipman, 2003).

In a similar vein, philosopher Richard Paul and educational psychologist Linda Elder (2006) defined critical thinking as a mode of thinking, about any subject, content, or problem in which the thinker improves the quality of his or her thinking by taking charge of their thinking and imposing intellectual standards upon it (Paul & Elder, 2006).

This view emphasized asking important questions or thinking open-mindedly and suggested that quality thinking must be flexible and adaptable to various contexts.

Critical thinking also holds conceptual frameworks in creative thinking (Glassner & Schwarz, 2006; Paul & Elder, 2006). Facione and colleagues (1995) maintained that critical thinking is an overarching disposition to the skills necessary for problem solving, creative thinking, and decision making, which are closely related forms of higher-order thinking—an idea that finds friction with Paul & Elder’s critical/creative, operating-in-tandem view, as mentioned earlier. Bailin and colleagues (1993) also argued that critical and creative thinking are overlapping concepts. Creativity is required for good thinking, and critical thinking is required for focused creativity. Paul and Elder (2006) have reminded us that when “students develop their rational, critical capacities, they develop their creative capacities. When students develop their creative capacities, they develop their critical capacities” (p. 35).

#### **Critical thinking and dispositions.**

Critical thinking requires dispositions of independent thought, intellectual empathy, courage, integrity, perseverance, intellectual curiosity, faith in reason, and intellectual responsibility (Paul & Elder, 2006). Without the motivation or inclination to engage in thinking that is productive (Moseley et al., 2005), optimal thinking cannot be realized (Facione et al., 2000; Halpern, 1998). Both the cognitive and dispositional components work together to account for critical thinking. Said another way, what makes for “good thinking” is now a question that “must be answered as much in terms of

people's attitudes, motivations, commitments, and habits of mind as in terms of their cognitive abilities" (Perkins & Ritchhart, 2004, p. 352).

The disposition to think critically is just as evident in artistic performances, scientific discoveries, and technological inventions as it is in more traditional notions. Critical thinking requires both doing and acting (Bailin et al., 1993). Lampert (2006) found that creative inquiry in the arts enhanced critical thinking competencies and dispositions. While the arts are not the only disciplines that develop creative and innovative thinking, art education seems to hold the key to developing certain types of creative intelligence (Csikszentmihalyi, 1990, 1993; Luftig, 1994).

#### **Critical thinking in the arts.**

Art theorists and teachers have reported that the arts promote the higher-order thinking skills of problem solving and decision making, because the arts require thoughtful and deliberate choice-making in order to adequately represent and communicate concepts (Eisner, 1998; Gullatt, 2007; Lynch, 2007). Lampert (2006) reported that critical thinking in the arts could be fostered through critiquing and interpreting works of art and reflecting on and considering multiple perspectives of artistic subject matter (including students' works).

Eliza Pitri's research (2003) expanded on the value of conceptual problem solving in the art classroom, saying that "the process of artmaking is more important than the product because it could and should involve thinking and problem solving" (p. 23). Heid (2005) claimed that the arts hold an important role in creating environments of critical inquiry, especially in fostering deep attention as a way of shaping healthy emotive brain

function. Other researchers have observed connections between cognition, social development, emotional development, and the arts (Melnick et al., 2008). Learning in the arts also enables deep engagement and perseverance in the learning process—habits of mind needed by tomorrow’s citizens (Costa, 2001; Posner, 2009; Smithrim & Uptis, 2005).

### **Research Surrounding Creativity**

Much has been written about the relationship between creativity and intelligence. Pioneering work by Getzels & Jackson (1962) and Guilford (1967) has been followed by a number of social, psychological, developmental, cognitive, and historical perspectives (Amabile, 1996; Csikszentmihalyi, 1988; Gardner, 1993; Sternberg & Lubart, 1999; Sternberg & O’Hara, 1999), resulting in a number of proposed theories. As has been found with other intelligent behaviors, creativity is not a fixed entity (Resnick, 1999; Sternberg, 2000, 2003). Nor is it only God-given and innate; creativity can be learned, cultivated, and expanded like other skills (Sternberg, 2000; Sternberg & Lubart, 1999, Sternberg & Williams, 1996).

Runco (1990) identified that a person’s implicit theories about their creativity or creativity in general also influenced their creative behavior. Early intelligence theories by Maslow which placed creativity in tension with discipline, effort, acquired skill, and perseverance (in Cunliffe, 2007; Weisberg, 1999), can therefore be refuted. Similarly, Sternberg’s research (2000, 2003) indicated that creativity is a decision which requires a balance of creative, analytic, and practical abilities. A balance of these skills ensures that



a person can create innovative ideas, an ability to critique those ideas, and the social/emotional skills to sell others on those ideas (Sternberg & Lubart, 1999).

Although defying definition, creativity generally refers to the skills and habits of mind needed to generate ideas and products that are novel and appropriate, high in quality, and fitting for the task at hand (Amabile, 1996; Runco, 1990; Sternberg & Lubart, 1999). Creativity is manifested in both process and product. Several researchers have agreed that creative behavior is comprised of multiple, converging components (Amabile, 1996; Csikszentmihalyi, 1996; Sternberg & Lubart, 1999). While it has not been totally clear if creativity is a general construct that surpasses disciplines or if it differs according to the domain in which it is being used (Sternberg, 2003a), research has identified coherent strands of creativity that support a broad, interdisciplinary view.

Anna Craft highlighted the necessity for a contemporary definition of creativity known as “little c” creativity (2001, p. 45) which focused on problem solving and the need for innovation in people’s everyday lives. This view comes closer to Claxton’s push for a “real-world” definition of creativity (2006, p. 353) and Paul and Elder’s claim (2006) that creative thinking “must be demystified and brought down to earth” (p. 34). Sternberg (2001) argued that creativity should not be isolated from other constructs of human abilities and was best understood in the interrelationship between intelligence, wisdom, and creativity. Craft (2006) agreed, emphasizing the need for connecting wisdom with creativity so that innovation is tempered by a concern with values.

Qualities and attributes embodied in the notion of wisdom (Craft, 2006; Sternberg, 2001), such as embracing multiple perspectives and being able to manage

uncertainty, are precisely those which engagement in the arts seems to develop. While Sternberg (2001, 2003) reminded researchers that creativity alone does not assure wisdom (nor does any other type of thinking), he said that “wise solutions are often creative ones” (p. 158). Sternberg illustrated his argument, saying that wisdom “involves creativity, in that the wise solution to a problem may be far from obvious” (p. 152). Sternberg’s balanced theory of intelligence (2003) suggested that wise action involves the active balance of intrapersonal, interpersonal and extrapersonal interests.

Paul (2006) reported on the symbiotic relationship between critical and creative thinking, suggesting that excellent thinking—quality thinking—results in creative ends. It is worth noting here that Anderson and Krathwohl (2001), in their revision of Bloom’s taxonomy, changed “synthesis” to “creativity” and moved it to the highest tier of intellectual functioning. The ability to create requires synthesis of ideas and discrete elements (Erickson, 2006).

Csikszentmihalyi (1990) reported that creativity relies upon determining and identifying ways of working through problems; creative individuals often view problem finding to be more important than the solution. The underlying mechanisms of creativity were found to be no different than other kinds of ordinary problem solving (Weisberg, 1992). Spectacular creative thought does not simply appear; it is rather, the product of years of learning, thought, and preparation (Weisberg, 1992). Creativity has been considered right-brained, but in reality it requires cognitive abilities such as working memory, sustained attention, cognitive flexibility, and appropriateness that are typically attributed to the prefrontal cortex (Damasio, 2001). Eric Jensen (2001) reported that

creativity requires imagination, originality, and insight (so often associated with the right-brain) plus logic and organization (so often associated with the left-brain).

Csikszentmihalyi (1996) has connected the capacity for deep attention or “flow” with creativity.

### **Creative thinking and dispositions.**

A poll of 143 creativity researchers revealed that the single most important ingredient in creative intelligence was related to perseverance and resilience, showing the importance of effort and motivation in the act of creativity (Sternberg, 1998). While certain traits and abilities are linked to creativity, its manifestation is dependent on the mediating presence of intrinsic motivation (Amabile, 1983, 1996, 2001). Creative behavior seems affected by the use of interrelated resources of intellectual ability such as knowledge, styles of thinking, personality, motivation, and environment (Sternberg & Lubart, 1999).

Teresa Amabile (2001) agreed that individual creativity does not depend primarily on talent; it is also affected by environmental influences which in turn affect motivation saying, “creativity depends not only on brilliance and wit but also on discipline and passionate desire” (p. 335). Expertise and creative thinking are an individual’s raw materials—his or her natural resources, if you will. But a third factor, motivation, determines what people will actually do (Amabile, 1999). Amabile’s componential model of creativity (1996, 2001) proposed a balance of skills and disposition that contributed to creativity: skills specific to the task (expertise), creative thinking skills (thinking and working styles), and task motivation. Other researchers also suggested that creativity is

not merely a set of skills but a group of habits of mind or thinking dispositions that recognize situations for which creativity is appropriate (Perkins et al., 2000).

Researchers recently asked the question, “Are creative people smart?” (Silvia et al., 2007, p. 1012), finding that creativity (as defined by divergent thinking) and intelligence were correlated. The connection was due in part, to openness to new experiences as variable that predicts both intelligence and creativity, but did not fully explain the relationship (Silvia et al., 2007). Bandura (1997) suggested that self-efficacy was essential to creativity. School environment can play a part such as when imagination is discounted at school; in such case Runco (1990) found that students may unconsciously sacrifice their creative potential. On a positive note, Burton, Horowitz, and Abeles (1999) concluded that learning in the arts contributed to middle school students’ creative thinking as evidenced in expression, imagination, risk taking, and curiosity/openness.

### **Practical Thinking and Intelligence**

It is important to not just teach students facts, but also to train them to think analytically, creatively, practically, and wisely (Sternberg & Grigorenko, 2004). Practical intelligence is the ability to adapt to everyday life by drawing on existing knowledge and skills. Analytical problems have one right solution whereas practical problems often have more than one right answer. Practical intelligence enables an individual to understand what needs to be done in a specific setting and then do it, often by relying on existing knowledge and skills—one’s tacit knowledge (Sternberg, 2003b). Sternberg believes that practical intelligence is closely related to wisdom, as in good or bad decisions (2001).

Wagner and Sternberg (1986) defined tacit knowledge to be of three specific types: (1) knowledge about self (intrapersonal), (2) knowledge about tasks, and (3) knowledge about interpersonal relationships. Tacit knowledge may be largely domain-specific (Sternberg & Grigorenko, 2000), which is why assessing practical thinking in the arts should entail real-world, practical uses of knowledge (about self, tasks, and others) within the context of art and design.

Gardner, Krechevsky, Sternberg, & Okagaki (1994) reported on the role of tacit knowledge in middle school students' academic performance in the six-year Practical Intelligence for Schools Project (PIFS). The project involved the determination of tacit skills necessary for success in school. Curricula were designed, disseminated in schools, and the results were analyzed. Results showed that students receiving the PIFS curriculum showed significantly greater increases in reading, writing, homework, and test-taking ability over the school year, compared with students in the same schools not receiving the curriculum.

### **Dispositions in Art Education**

Cunliffe (2007) suggested that cognition is structured and acquired through a deliberate use of dispositions and skills. Learning in the arts combines creative and perceptive forms of thinking which lead to different forms of meaning (Winner & Hetland, 2000a). Cognitive development through the arts is in this way, a multifaceted process involving creativity, self-direction, and complex thinking (Darby & Catterall, 1994). Although research by Moga, Burger, Hetland, and Winner (1999) showed some support for a causal relationship between studying the arts and academic performance on

figural creativity tests, they suggested that more prevalent might be the relationship of arts education and a resulting problem-finding attitude. Others had previously hypothesized that arts students might be better at problem finding over and above problem solving (Csikszentmihalyi, 1990). Focus on the dispositions and skills acquired in the process of art making should be emphasized (Pitri, 2003; Sylwester, 1995), as research continues to point to the likelihood that it is dispositions and modes of thinking and working that are more likely to transfer to new situations (Hetland & Winner, 2004; Perkins, 2001).

Carr and Claxton (2002) referred to mindfulness, experimentation, and imagination as subsets of the disposition of “playfulness,” as necessary to creating an open system of learning and perception (p. 14). Further, imaginative students have been found to be more persistent, self-controlled, and joyful (Carr & Claxton, 2002). Lampert (2006) linked learning in the arts with the creative dispositions of experimentation and open-mindedness, which are also considered aspects of critical thinking. A willingness to show playfulness, said Csikszentmihalyi (1996), was connected to one’s capacity for deep attention in the arts toward greater creativity or flow.

Breakthroughs in cognitive science have led to possible links as to the influence of the arts on learning especially between the areas of engagement (Csikszentmihalyi, 1990; Lynch, 2007), sustained attention, and perseverance (Lynch, 2007; Posner et al., 2008). Recent research revealed that the brain networks involved in executive attention and effortful control can be strengthened by concentrated learning in the arts. This tendency for “paying close attention” in arts-based learning could be due to the inherent

enthusiasm that many young people have for music, art, and performance (Posner et al., 2008, p. 3). Through the intense focus often required during arts activities, driven by motivation and self-regulation, Posner found that children's attentional networks were strengthened, leading to improved overall cognition.

Habits that are associated with artistic creativity such as a tolerance for ambiguity, the ability to take risks, and deal with uncertainty, for instance, are essential to creativity and common in practicing the arts (Amabile, 1996). Paul and Elder (2006) reported that creative students tend to seek novel solutions to open-ended or ambiguous problems based on divergent thinking. Burton, Horowitz, and Abeles (1999) concluded that learning in the arts contributes to students' creative thinking as evidenced in expression, imagination, risk taking, and curiosity.

Nancy Lampert's empirical study (2006) investigated dispositions of critical thinking between arts and non-arts undergraduate students. Fine arts college students were found to have significantly higher mean scores than non-arts students on dispositions such as inquiry, maturity, and open-mindedness, suggesting that visual arts curriculum and instruction may enhance critical thinking dispositions. Lampert (2006) argued that these categories are highly aligned with creative exploration and the analysis of open-ended problems with no obvious solution. Lampert's work supported former research and theory claims that learning in the arts requires critical analysis and fosters an understanding of multiple perspectives and solutions (Burton et al., 2000; Heid, 2005). Cross (2007) agreed that the unique problem-solving skills that are developed and

required in the field of art and design, led to “designerly ways of knowing” because problems and solutions were developed together (p. 17).

In an attempt to study the underlying dispositions that are utilized by students when the arts are taught well, Hetland, Winner, Veenema, and Sheridan’s “Studio Thinking” project (2007) revealed eight important and potentially generalizable habits of mind that are fostered in visual arts classes: the dispositions to observe, envision, express, reflect, stretch and explore, engage and persist, develop craft, and understand the art world. Hetland’s team sought to expand on two previous Harvard Graduate School of Education’s Project Zero research projects: Arts PROPEL (Winner & Simmons, 1992) and dispositional theories of thinking (Perkins et al., 1993; Ritchhart, 2002). Dispositional theories proposed that skills must be accompanied by the inclination to use them in order for good thinking to be evidenced. Quality thinking is dependent on sufficient domain knowledge and practice; it improves with understanding within a given domain (Bransford et al., 2000, p. 136; Moseley et al., 2005).

### **Balanced Thinking Skills in Art Education**

A review of the literature regarding a balance of critical and creative thinking is somewhat limited in art education (Bailin et al., 1999; Hokanson, 2007). Most of the literature related to quality thinking in the arts, as defined as a balance of critical, creative, and practical thinking has treated them as separate entities. Dai and Sternberg’s research (2004) emphasized the creative and cognitive as well as the affective dimensions of thinking (Dai & Sternberg, 2004), highlighting a corresponding need for balance within the field of art education. Fostering students’ competencies in creative thinking



together with problem solving has been a neglected issue in traditional arts classes. A “design thinking” perspective promotes this balance, lending to the supportive role of critical thinking to creativity and creativity to critical thinking, and leading to greater development between both processes (Bailin et al., 1993; Burnette, 2005; Cross, 2007; Burnette & Norman, 1997).

While most arts students will not become famous artists (Sahasrabudhe, 2006), art education can assure that the far-reaching benefits of creativity, critical thinking, meaning-making, and the social/emotional aspects necessary to learning systems (Fullan, 2001) are curricular aims. Cognitive science has confirmed Fullan’s claim (2001) that “learning is meaning-making that requires a radically new way of approaching learning” (p. 191). Especially in the arts classroom, quality thinking, discipline, and rigor should be at home with creativity and innovation since the creative and the critical are interwoven (Paul & Elder, 2006).

Howard Gardner’s research into students’ multiple intelligences has led to his expanded appeal for fostering a balance of students’ intelligence toward overall synthesis (2007). Gardner promoted the concept that creativity is balanced by the inclusion of boundaries and enhanced by a convergence of connection-making (synthesizing) and practical (responsible) disciplines. To Gardner (2007), synthetic thinking requires conceptual agility. Similarly, Dorn, Madeja, and Sabol (2004) reported the need for curricula in the arts that involves a synergistic and integrative link between the critical, creative and reflective processes of critical thinking and creative practice. They claimed

that study in the arts opens children's minds to alternative ways of thinking, or what they called the "life of the mind" (p. 79).

Synergistic and critical thinking in visual art has been promoted through the organization of instruction involving essential questions and the use of "big ideas" (Gude, 2007; Stewart & Walker, 2005; Walker, 2001; Wiggins & McTighe, 2005). A curricular approach which focuses on the teaching of "enduring understandings" through the use of "essential questions" has been found to increase students' (and teachers') ability to synthesize their thoughts and deepen their thinking (Wiggins & McTighe, 2005, p. 342). Enduring understandings are core generalizations about big ideas, which requires student inquiry and construction of knowledge toward a particular learning standard.

Investigation of big ideas focuses on concepts surrounding broad, important human issues that are often characterized by complexity, ambiguity, and contradiction (Walker, 2001). Inquiries into big ideas also deal with interdisciplinary subjects, such as the role of art and artists in reflecting and shaping history and culture. In this way student thinking is expanded beyond the art education objectives of technical skills, formal properties, and media choices (Gude, 2007; Walker, 2001).

The belief that the teaching of art and design should focus *more* on meaningful and personal inquiry from a critical theory point of view, and *less* on curriculum and standards surrounding the elements and principles of art and design (Gude, 2007) should not be confused with a design thinking approach which promotes the analytical, creative, reflective, and integrated *process* of learning and understanding (Burnette & Norman, 1997; Cunliffe, 2007; Norman, 2000). For this research, it is important to make this

distinction, as an arts curriculum embracing big ideas and critical theory need not be held in tension with a curriculum that utilizes design thinking approaches.

### **Project zero and thinking.**

Project Zero researchers at Harvard University have undertaken several projects surrounding the arts and thinking that investigated the nature of critical and creative thinking, and teaching and assessing thinking dispositions. The research revealed that inclination and sensitivity make unique contributions to intellectual behavior and learning (Perkins et al., 2000). Early Harvard “Patterns of Thinking” research projects prompted three other thinking projects: Artful Thinking, Visible Thinking, and Cultures of Thinking. In all three studies, it is apparent that thinking, a reasoning attitude, and personal motivation lead to better thinking quality. An overarching concept of all three projects (although only one is named as such) was the idea of “visible thinking” which involved:

- articulating and explaining the thoughts behind a particular conclusion
- ‘seeing’ one’s cognitive abilities
- making thinking explicit and a natural part of the classroom conversation and life
- setting the stage for internalizing powerful practices of thinking and learning

The “Artful Thinking” research project used works of visual art and music along with thinking routines to develop students’ habits of mind and learning. The goal was to emphasize students’ patterns of thinking and make them more visible by asking provocative questions, making careful observations, exploring multiple viewpoints, and reasoning with evidence (Tishman & Palmer, 2006). This integrated approach showed the

value of developing a cognitive balance of critical, creative, and practical thinking, along with appropriate dispositions and overall improved thinking.

In using these critical thinking skills, students in the Artful Thinking project were found to be stronger in critical thinking than students who did not participate in the program. This confirmed former “Visual Thinking” research by Tishman, MacGillivray, and Palmer (1999, 2002) at the Museum of Modern Art (MoMA) in New York City which revealed that children’s ability to draw inferences about artwork transferred to their reasoning about images in science, a critical skill that involved close observation and critical reasoning (Tishman et al., 2002). Visual art was used as an entry point for developing students’ thinking skills in the areas of perspective-taking, reasoning, problem finding, and metaphor-making.

Ritchhart (2002) and colleagues’ work, the Cultures of Thinking project, influenced a theory of intellectual character, which strove to support the effect of classroom and school cultures on dispositional aspects of thinking. They found that positive cultures of thinking nurtured good thinking, which helped students develop deeper understanding as evidenced through performances of understanding (Perkins, 1998, 2005; Ritchhart, 2002). This work emphasized the interdependent relationships among thinking, learning, and understanding from a holistic view of intelligence.

Ritchhart (2002) defined intellectual character as “the overarching conglomeration of habits of mind, patterns of thought, and general dispositions towards thinking that not only direct but also motivate one’s thinking pursuits” (p. xxii). He claimed that learning well is a product of thinking well, and learning is made visible if

students truly understand what they are learning. Ritchhart's framework (2002)

comprised a theory of overall good thinking which is summarized in the following:

- Creative thinking – thinking that is “looking out”, “looking up” and “looking about” and contains the dispositions of being open-minded, and curious
- Reflective thinking – thinking that is “looking within” and contains the disposition to be metacognitive and reflective
- Critical thinking – thinking that is “looking at”, “looking between” and contains the dispositions of being strategic/skeptical and seeking truth and understanding. (p. 27)

### **Design thinking as balanced intelligence.**

While teaching for critical thinking has received acceptance in the education community, teaching for creativity as a way to improve critical thinking has not (Bransford et al., 2000). Brad Hokanson (2007) claimed that creativity in education is rarely taught or valued. And oddly enough, even within art and design, creativity is not always nurtured or taught. Visual arts education, says Cunliffe (2007), is more focused on the expansion of creativity, the expansion of quality, or an expansion of the social/emotional aspects of art rather than thinking.

Daniel Pink (2005, p. 3) has promoted design thinking as a “high-concept aptitude” that will give designers the competitive advantage in 21<sup>st</sup> century life and work. Hokanson (2007) and others who have developed design thinking models which combine visual art and design thinking, have promoted educational practices which train for a balance of thinking skills and dispositions (Burnette et al., 1997; Norman, 2000).

Burnette and Norman's “Design for Thinking” approach (1997) has been promoted for its value toward incorporating design thinking into the art education curriculum. The skills

and dispositions inherent in a more balanced definition are supported by definitions of design-based education which combine visual art with critical, creative, and practical modes of thought (Burnette, 2005; Burnette & Norman, 1997; Hokanson, 2007; Norman, 2000).

Nigel Cross, design theorist and researcher (1999a, 1999b), asserted that the discipline of design involves a specific awareness and ability, independent of the different professional domains. Just as other intellectual cultures in the sciences and the arts concentrate on underlying forms of knowledge that are particular to their domain, artists and designers are driven by “designerly ways of knowing,” thinking, and acting, says Cross (2007, p. 17). It is in this sense that design, generally understood as a creative outcome, is also understood as disciplined creative thinking. This idea provides needed balance within the field of art education.

Design educator, Dr. Charles Burnette (2005) defined “design thinking” as the following:

Design Thinking is what people do when they pursue their goals. Everyone focuses their thinking in order to satisfy wants and needs regarding a particular situation. They recognize and define information according to their purpose, consider alternatives, decide what to do, do it, determine if they are satisfied with the results, and if not revise their approach until they are successful, all while learning through the experience. This is designing. It is a process of creative and critical thinking that allows information and ideas to be organized, decisions to be made, situations to be improved and knowledge to be gained. Purposeful thought and action is the basis for all human achievement and found in all subject disciplines. (para. 1)

Burnette and Norman (1997) were the developers of a design-based K-12 education program utilizing analytical thinking and creative problem-solving instruction across disciplines for the promotion of higher-level thinking skills in the arts. They

devised a model for teaching and learning that focused on creative thinking, effective communication, cross disciplinary connection-making, and productive behavior which aligned project-based experiences with valued outcomes. Supported by a state and national grant initiative, a national pilot program was launched in 1990 that generated state-wide workshops on “Design Based Education” in Pennsylvania and instruction in over 500 schools. Originally dubbed “I/DEPPE/I,” it evolved into “iDESIGN,” an acronym that represents seven modes of design thinking identified as Intending, Defining, Exploring, Suggesting, Innovating, Goal-getting, and Knowing (Burnette, 2005). These different modes of thinking were intended to help students structure and perpetuate the learning process as being as valuable as the final product.

Current research has shown the need for new paradigms of intelligence (Resnick, 1987; 1999) which embrace more balanced and equitable expressions of thinking (Sternberg, 2008) and new models of teaching and learning (Ritchhart & Perkins, 2008). Today’s students need to be more self-directed (Costa, 2006; Lipman, 2003; McCombs & Whisler, 1997), possessing a balance of intelligence which enables them to think for themselves and go beyond content knowledge toward anticipating creative solutions to problems. The review of the literature in the following section encompasses overall learner-centered teaching practices and those specific to this research (inquiry, connection-making, and self-direction in learning).

### **Best Practice Research and Learner-centered Instruction**

A complex power struggle exists between policy-making (Darling-Hammond, 1997) and the more child-centered purposes of schooling. The creation of meaningful

learning experiences that focus on development of the whole child and instilling a sense of wonder and curiosity (Ritchhart, 2002) are integral to motivation and engagement (Catterall, 2002; Nichols, 2006; Stipek, 2002). The incorporation of best practice research as it applies to learner-centered environments comes closer to constructivist notions (Claxton, 2006b, McCombs & Whisler, 1997; Ritchhart, 2002) but is often overshadowed in an era of high-stakes testing (Eisner, 2002; Robinson, 2001). Classrooms that employ student-centered learning goals, inquiry, and connection-making are constructivist environments which are found to promote students' self-direction, greater sense of self-efficacy, confidence, motivation, and desire to learn (McCombs, 1994a; Bransford et al., 2000).

Research on building individual learning capacity through redesign of classroom cultures (Claxton, 2006b; Perkins & Ritchhart, 2004) is rare in art education. As this research pertains to the comparison of qualities of thinking classrooms that are more learner-centered by design and those that are less so, this section of the literature will begin with existing tensions within the field of art education as to its inclusion of best practice research (Luftig, 2000).

#### **Art education and learner-centered practices.**

Disagreements as to what the primary curricular objectives of art education should be, have complicated its already marginalized status in the education community (Luftig, 2000; O'Fallon, 2006). Art education's reputation as a loosely shaped field in need of conceptual and strategic reframing, has placed responsibility on art teachers to resolve its marginalized status in the education community (Luftig, 2000; O'Fallon,



2006). Researchers have called for the field to better prepare teacher-leaders who can contribute to the educational community, incorporate best practice research, and better position art education in the midst of current political climates (Smilan, 2007). While curriculum and instruction movements have been concerned with issues related to academic achievement, cognition, or motivation (Darby & Catterall, 1994), arts education has focused on the value of the arts in creating persons in touch with themselves and their culture (Eisner, 1998; Luftig, 2000).

Frameworks of inquiry, constructivism, and self-motivation (mind, body, and emotion or spirit), characteristic of learner-centered classrooms, capitalize on students' natural curiosity for deeper integration and internalization of what they learn in meaningful ways (APA, 1993). Learner-centered environments maintain a focus on learning and understanding—for the goal of training independent, life-long learners who possess a balance of thinking and process skills (Bransford et al., 2000; McCombs & Whisler, 1997). In the present study, this focus is fostered by personal goal-setting (Resnick & Klopfer, 1989) and self-direction (Bransford et al., 2000; Grabinger & Dunlap, 1995), which in turn can lead to greater self-efficacy and realized success (Nichols, 1996; Pintrich, 1999). Qualities of thinking developed in art classrooms that promote inquiry, connection-making, and student involvement in their learning goals are the focus of this research.

It is a hypothesis that learner-centered classrooms—those that value curiosity, self-direction, and meaningful connection-making—can enhance qualities of thinking (Bailin et al., 1993; Sternberg & Grigorenko, 2000) in arts classrooms. Learning in the

arts not only supports overall learning but addresses the whole child: intellect, emotion, and body (Lynch, 2007). Gullatt's research (2007) revealed that active, self-motivated learning, collaboration, and risk taking are valued skills for the future; these are capacities common to the arts. A review of the literature surrounding learner-centered environments will be followed by contributions from art education research toward this conversation. Terminology may vary, but in theory there are many relationships that can be made between art classrooms and learner-centered classrooms. Their commonality, however, is limited in areas of current art education research and the ways that arts classrooms work to inform best practices in teaching.

### **Theoretical Frameworks**

Learner-centered classrooms build on constructivist approaches to education, which contend that students should be actively involved in the learning process. Socrates used problems and questions to guide students to analyze and think about their learning. Rousseau held that knowledge came through direct experience and through the senses (in Palmer, 2005). In the early 1900s, John Dewey (1910) proposed student-directed reforms and experiential learning. Piaget (1952, 1978) strengthened this work, as he recognized that knowledge is not acquired in a vacuum or by absorbing information; it is constructed actively through direct involvement. Bruner (1961), who emphasized learner agency, also advocated discovery or inquiry learning around realistic problems. Lev Vygotsky (1978) added the importance of social learning, which has found new support in the work of cognitive scientists such as Resnick and Nelson-LeGall (1997). Obvious pedagogical

links exist to differentiation (Tomlinson & McTighe, 2006) or what is known as personalization in the United Kingdom (Hopkins, 2006).

The degree to which classrooms are learner-centered is based on a strong body of evidence that students use existing knowledge to construct new knowledge. What students know and believe about what they know and believe affects how new information is interpreted (Resnick & Hall, 2000, 2005). The goal is to “educate more critically reflective students, committed to developing a capacity to learn” (Fisher & Rush, 2008) who are able to make connections between their previous knowledge and new knowledge in a way that is meaningful and usable (Bransford et al., 2000, p. 9). Cognitive scientists, Bransford, Brown and Cocking (2000) have reported on four interrelated attributes of effective learning theories that represent a radical constructivist model of learning: those that are (1) learner-centered (attention given to knowledge, skills, attributes, and beliefs), (2) knowledge-centered (understanding over and above test scores), (3) assessment-centered (formative feedback given); and (4) community-centered (learning from each other).

Consideration toward a “design thinking” approach for art education should not be overlooked (Norman, 2000) for its conceptually close connection to learner-centered teaching practices that fuse constructivist, inquiry-based, and self-directed learning with current research and best practices. A “Design for Thinking” model (Burnette, 2005; Burnette & Norman, 1997) serves as an example in this study for art-based classrooms that equally value process and product (Sternberg & Lubart, 1999), and in which students

engage in analysis, exploration, planning, producing, evaluating, and integrating their thinking and artmaking.

Art education programs that recognize the need for training for balanced thinking and successful intelligence (Sternberg, 2003a) also may come closer to this aim. A design thinking curriculum involves new paradigms of best practice teaching: constructivist-approaches in a relevant, hands-on context; active, learner-centered orientation where students are not passive, and the teacher is facilitator, not a “sage on the stage” (Norman, 2000, p. 93). Design thinking practices also utilize inquiry-based investigations into subjects of personal interest to students, and students are more in charge of their learning.

### **Producing Life-long Learners**

Nicols (2006) suggested that empowerment and affirmation result in classroom environments that allow students to become autonomous and creative learners, while instilling in them a sense of personal value and worth and a lifelong desire for learning. Students have been found to take more control of their own learning in classroom environments that are affirming, promote student agency, and put students more in charge of their learning (McCombs, 1994a, 1994b). When students are engaged and feel respected, more constructive participation is promoted; it also creates relationships within which teachers and students can communicate and learn from one another (Lipman, 2003; Noddings, 1992). Additionally, schools that nurture cultures of trust, respect, caring, and concern (McCombs, 1994a, 1994b; Noddings, 1992) provide the social interaction supports found to increase cognitive development and creativity in students’ learning (Dai & Sternberg, 2004; Resnick, 1999; Resnick et al., 1997). The following

section investigates other affective connections to learning as relevant to the current study.

### **Student Agency, Self-efficacy, and Learner-Centered Classrooms**

Student agency (Bruner, 1996)—active engagement by students in constructing the terms and conditions of their learning—is a closely related aim to the self-directed learning goals more often found in constructivist classrooms. Personal agency together with self-efficacy are central to the construction of a concept of self; thus, it makes sense for schools to be concerned for the unique contribution they make to these two crucial ingredients (Bandura, 1989; Bruner, 1996).

Students' concept of self, as in their belief in their ability to succeed, their sense of control over their own life and choices, the “clarity and saliency of personal values, interests, and goals,” and overall mindset, can either motivate or interfere with their ability to learn (APA, 1993, p. 7). Students develop a sense of their world and their abilities based on life experiences and the belief systems they hold (Bruner, 1996). Students develop the internal motivation to participate in activities that they feel are internally rewarding. Stipek (2002) stressed the importance of the internal factors of the learner, saying that competence and self-efficacy are often equated. She reported on the potential positive outcomes of learner-centered classrooms, in that students find emotional satisfaction through approaching and accomplishing challenging tasks in which they are personally invested.

Social constructivist theorists Vygotsky (1978) and Bruner (1996) highlighted the importance of learner agency. In their work, learners' capabilities are seen as personal

and social meaning-making. Bandura distinguished between self-efficacy and self-esteem in that “perceived self-efficacy is concerned with judgments of personal capability, whereas self-esteem is concerned with judgments of personal worth” (1997, p. 11). This distinction implies individuals need not consider themselves capable at all things in order to have strong self-worth. Specific to this research, arts classrooms are studied for their effect on students’ self-determinations (agency) in learning (Twining, Craft & Chappell, 2007).

### **Self-efficacy and motivation.**

Student motivation and achievement are positively impacted by perceptions of self-efficacy (Bandura, 1997; Nichols, 2006). Self-esteem and internal, intrinsic motivation are not ensured by self-efficacy alone; it must be accompanied by a sense of autonomy (Deci & Ryan, 1991). Lipman (2003) claimed that learning communities which support autonomous learning allowed students to think for themselves, to feel safe to ask questions, and to more actively engage in the discovery process of education out of genuine desire. Student motivation based on internal, personal structures also promotes future self-directed behavior (Nichols, 2006). This research suggests that tradition-based control and compliance structures in schools would be better replaced by a greater emphasis on self-motivation and self-regulation.

As mentioned in an earlier section, brain imaging studies (Posner et al., 2008) have offered insight into how intrinsic student motivation in the arts increases deeper thinking and understanding, which leads to greater chance of transfer. Catterall’s ten-year study in arts learning (1999) followed by his 12-year longitudinal study of more than

12,000 students (2009), continued to show that learning in the arts holds critical links for students, particularly in the motivations of those who are at-risk and failing in school. Catterall's most recent study (2009), notably suggested that intensive involvement in the arts during middle and high school was associated with higher levels of achievement and college attainment, as well as improved social/emotional skills.

Likewise, increased self-esteem has been a common claim of the arts in learning. Brice, Heath, and Roach (1999) found that students in out-of school arts programs scored higher in self esteem than those students who had not participated in such programs. Similar accounts have been reported by Rabkin and Redmond (2007), Burton (1999), and Deasy (2002).

### **Performance Goals vs. Learning Goals**

Students' concept of self (e.g., belief in his or her ability to succeed, sense of control over his or her own life and choices, the "clarity and saliency of personal values, interests, and goals" and overall mindset), can either motivate or interfere with their ability to learn (APA, 1993, p. 7).

Student's tendencies to put their thinking capacities into action (Langer, 1993; Perkins et al., 1993) depend on their underlying belief systems about their abilities. Research shows that student belief systems about their intelligence and the nature of their goals can deeply affect their capacity to learn and perform (Bransford et al., 2000, p. 102). Students who perceive themselves as capable have been found to make greater academic gains (Zimmerman, Bandura & Martinez-Pons, 1992). How students interpret

their learning influences their goal orientation, thoughts about success or failure, and ultimately their beliefs about capabilities (Nichols, 1996).

Dweck (1995) has offered insight into two self-theories that affect student learning. The first self-theory says that intelligence is a fixed entity; these students are more likely to hold “performance goals” rather than “learning goals;” they want to seem intelligent rather than risk making mistakes while learning and are more likely to give up when tasks become difficult. In contrast, the second theory says that intelligence is expandable or incremental. These students are more willing to struggle with challenging tasks and are more comfortable with risk (Dweck, 1995; Dweck & Leggett, 1988; Resnick & Klopfer, 1989). Said another way, goal orientation is a filter that affects student performance. Students who possess a learning goal orientation and base their views of success on gaining ability rather than on comparing themselves to others tend to attempt more difficult tasks and are more persistent. These students interpret occasional failure as normal. On the other hand, students who possess performance goals tend to base their success on comparing themselves to others, and they show less persistent attitudes in times of difficulty. They perceive failure to be a result of their lack of ability or effort (Dweck, 1995; Dweck & Leggett, 1988). Since student belief systems also affect capacity for balanced thinking, especially critical and creative thinking (Fisher & Rush, 2008; Amabile, 2001), it is wise for art educators to consider their effects.

### **Constructivist Connection: Self-Directed Learning**

The implementation of student self-direction in learning implies that students are given a certain amount of autonomy in their learning. Self-directed learning is a process



in which students initiate, monitor, and reflect on their own learning, and it is an important and challenging outcome for 21<sup>st</sup> century classrooms. According to Pintrich (1999), self-directed learning is driven by several primary elements: motivation to learn, cognitive strategies, metacognitive strategies, and persistence. Students benefit from learning to solve problems and thinking independently within learning cultures that support quality thinking (Bransford et al., 2000; Resnick & Klopfer, 1989; Ritchhart, 2002; Silva, 2008). Student-centered learning environments place emphasis on student construction of goals that foster personal responsibility and initiative for one's own learning (Grabinger & Dunlap, 1995). The integration of skill and will in self-regulated learning has also been considered (McCombs & Marzano, 1990; Resnick & Hall, 2000, 2005).

Research has indicated that if student independence is structured carefully and appropriately, learners will achieve at a higher level, use higher-level reasoning strategies more frequently, experience higher levels of achievement motivation, be more intrinsically motivated, have higher self-esteem, and be more skilled interpersonally (Johnson, Johnson & Holubec; 1994). Pintrich (1994) has revealed the importance of building greater self-efficacy and students' metacognitive abilities to self-direct their learning. McCombs (1994a, 1994b), however, suggested that students experience gains in achievement and internal motivation in environments that empower them, rather than control and insist on compliance. From a psychological stance, Crabbe (1993) found that autonomy and self-direction in learning led to more meaningful, permanent, and personal understandings. Likewise, McCombs (1994a) expressed the importance of individual

choice, allowing a level of student autonomy and agency, and providing an environment where students are free to take risks or even to fail.

### **Self-Directed learning and creativity.**

Strom and Strom's research (2002) utilized self-directed behaviors characteristic of creative thinkers merged with cooperative learning and creative thinking, resulting in declines in student boredom. Similarly, self-directed learning that allowed freedom and choice have been linked with enhanced creativity (Twining, Craft & Chappell, 2007). Creative students have been found to complain less about being bored during self-directed activities, implying that boredom can foster creativity that stems from not knowing what to do next which satisfies an internal need for stimulation (Singer, 1999).

### **Constructivist Connection: Active Learning and Connection-making**

*"Wisdom begins in wonder." –Socrates*

Learner-centered environments capitalize on constructivist notions that learning is a connection-making process. The arts, as they are the focus of this study, are by their very nature interconnected and linked with many things—social issues, aesthetics, modern trends, history and culture, science, and mathematics—providing a bridge to other diverse contexts and ideas that tie all peoples together.

Connection-making is something the brain does best (Bransford et al., 2000). The brain relies on students' abilities for making deep and meaningful connections in order to learn and create patterns of meaning (Caine & Caine, 1997). Thus, "to advocate teaching for meaning and then to deny students the opportunity to explore and ask the most profound questions about how what they are learning relates to a meaningful life is

absurd,” said Caine and Caine (1997, p. 96). People learn by using what they know to make connections, and learning is enhanced by integration of all subjects, including the arts.

Over 2400 years ago, Socrates initiated a method of teaching which recognized that all new understanding is linked to prior understanding (Bransford et al., 2000). By linking into students’ former knowledge, experiences, and beliefs, Socrates moved them toward critical thinking and deeper understanding of a subject (Copeland, 2005). The Socratic Method acknowledges that good thinking does not involve an isolated set of questions and answers (Bransford et al., 2000). Dewey’s approach to education (1963) also connected experience and prior knowledge to subject matter knowledge (new knowledge).

Research has made known that previous knowledge helps or hinders the understanding of new information (Bransford et al., 2000). The interdisciplinary field of learning science—including cognitive science, educational psychology, and neuroscience, suggests that quality learning and thinking occurs when basic skills are taught in combination with complex thinking skills. Learning is no longer considered a purely linear process, with certain abilities preceding the development of other skills (Silva, 2008). Seminal research by the U.S. Department of Education on learning in mathematics revealed that while there are building blocks of knowledge, students learn best when the curriculum simultaneously develops basic skills with higher-order thinking skills (in Silva, 2008).

### **Active vs. passive learning.**

Open and active instruction that rewards risk-taking, connection-building, and sense-making has been found to not only facilitate transfer of learning, but also build students' autonomy (Ritchhart & Perkins, 2000). An active, constructivist concept of learning assumes that learning is by nature an active endeavor and that different people learn in different ways (Dewey, 1963); it lies in contrast to passive learning.

Tsui's research (2002) indicated that when teachers are willing to engage in more active instructional strategies, rather than passive, greater student retrieval from memory and greater transferability to new situations results. Erickson (2006) attributed retention, transfer, and understanding of knowledge to pedagogies that lead to sophisticated, complex thinking—"synergistic thinking"—which require the mind to process information on more than one cognitive level at once. Synergistic thinking looks at both the factual and conceptual integration of thinking (Erickson, 2006).

### **Constructivism and the teacher's role.**

A shift in teacher/student roles must occur as students become investigators, seekers, and problem solvers, and teachers become facilitators and guides (Dewey, 1910; Bransford et al., 2000; Project Zero, 2001); less emphasis must be placed on transmitting information and more on developing students' skills. Stemming from a constructivist philosophy and that learning how to learn is more important than any certain content (Claxton, 2006b; Sayers, 1947), teachers are not considered the source of all knowledge, but rather act as facilitators and guides in the learning process (Wiggins & McTighe, 2005; Stripling, 2003).

Constructivist, learner-centered teachers and students engage in learning together with multiple ways of access to learning (Twining, Craft & Chappell, 2007). Teachers are expected to be more responsible to the needs and skills of individual learners (Twining et al.; 2007). Dewey (1963) criticized very traditional models of teaching that did not make learning relevant and hindered students' capacities for learning and thinking. Dewey's thoughts on this matter were summarized in his following objections (1963):

How many students . . . lost the impetus to learn because of the way in which learning was experienced by them? How many acquired special skills by means of automatic drill so that their power of judgment and capacity to act intelligently in new situations was limited? How many came to associate the learning process with ennui and boredom?

How many found what they did learn so foreign to the situation of life outside the school as to give them no power or control over the latter? How many came to associate books with dull drudgery, so that they were "conditioned" to all but flashy reading matter? (p. 26–27)

### **Connection-making in Art Education**

Hamblen (1997) reported that when students explored historical and cultural connections in art, their involvement in inquiry, problem solving, investigation, analysis, synthesis, and evaluation increased. Her critical thinking research (Hamblen, 1997) warned against the overriding emphasis of memorization of facts due to standardized test pressures on the development of students' higher-order thinking in art history classes.

The International Baccalaureate Program (2009b) serves as an educational model that philosophically aligns with constructivist, process-led views of learning and links new knowledge to existing knowledge. Holistic learning stands as one of the fundamental concepts of the IB mission statement, representing the notion that all knowledge is interrelated. IB students discover relationships between areas of knowledge, the

individual, community, and the world through trans-disciplinary themes which provide a springboard for the investigation of personally and globally significant issues. The IB middle years program (2009a) emphasizes thoughtful learning and connection-making within pedagogy of enduring understandings (Gardner, 1999; Wiggins & McTighe, 2005). Arts students within the IBP conceptualize their knowledge in a variety of ways through performances of understanding (Gardner, 2007; Perkins, 2005), thereby making students' thinking and learning visible, observable, and assessable. Performances of understanding allow for public exhibition of student knowledge and displays of deeper understanding of a subject, over and above giving a single, standardized test answer.

Harvard Project Zero researchers together with the Reggio Emilia schools of Italy have capitalized on the communication power of art, by using it to visually document students' learning as a way to facilitate deeper thinking (Project Zero and Reggio Children, 2001). While the arts are considered core subjects in Reggio Emilia schools utilizing the "atelier" or studio approach, the visual arts are also used as critical and practical diagnostic tools for visible learning (Twining et al; 2007; Giudici et al., 2001). In making students' learning more visible, the transfer of their learning to other contexts has reportedly increased (Project Zero and Reggio Children, 2001).

An example of whole-school reform and achievement through connection-making is found in the A+ Schools Program in North Carolina. The A+ schools model is state-supported and utilizes art-specific instruction and arts integration along with Gardner's multiple intelligence theory and brain research (Nelson, 2001). After a 4-year pilot study, A+ schools showed gains equal to those of students statewide in mathematics and

reading, a notable fact since these schools serve larger proportions of minority students than the state overall and have achieved results without narrowing the curriculum (Nelson, 2001).

**Arts integration: Inner tensions.**

Arts integration has been referred to by many names: cross-disciplinary, interdisciplinary, infused, thematic, trans-disciplinary, multidisciplinary, holistic, and blended (Russell & Zembylas, 2007). Although not intended to imply that the arts should not be taught as stand-alone subjects, arts integration is defined for this research as “the use of two or more disciplines in ways that are mutually reinforcing, often demonstrating an underlying unity” (Consortium of National Arts Education Organizations, 1994, p. 13). Art integration balances the teaching of a necessary body of knowledge that is sophisticated and in-depth, with rigorous and investigative learning experiences (Mishook & Kornhaber, 2006; Taylor et al., 2006); it also recognizes the value of cross-disciplinary and interdisciplinary content and instruction. The National Research Council (Bransford et al., 2000) asserted that an integrated curriculum allowed for application of knowledge to multiple contexts, which in turn encouraged deeper understanding of concepts.

Despite positive research regarding arts integration for building cognitive skills, disagreement from within the art education community has surrounded its use. Adding to philosophical differences as to the aims of art education, tension has existed between proponents of “art for arts’ sake” (Aprill, 2001; Eisner, 1998; Winner & Hetland, 2000b) and those more in favor of arts integration (Catterall, 1998; Lynch, 2007; Rabkin &

Redmond, 2006). Beliefs that the arts should stand alone as a discipline (Winner & Hetland, 2000b) have opposed others that embrace a more varied approach to its definition and value (Mishook & Kornhaber, 20006; Parsons, 2004). Russell and Zembylas' study (2007) of refereed, published empirical studies on arts integration revealed that the field of art education could better be served by dismissing the dualistic tensions and regarding arts integration for its mutually beneficial relationship between art and student learning.

### **Connection-making and arts integration.**

By approaching arts topics through diverse entry points (Gardner, 1999, 2007; Winner & Hetland, 2000a), a greater synthesis in thinking occurs. This has led to deeper understanding for students (Tomlinson & McTighe, 2007). In an examination of students' cognitive processes while engaged in arts-integrated instruction, DeMoss and Morris (2002) reported that connectivist environments promote learning communities, enhance students' motivation to learn, improve students' logical writing skills, develop emotional connections through writing, and help students better engage with subject content. Findings such as these are important to this research, especially in regards to connection-making and its position in learner-centered classrooms.

Proponents of an integrated curriculum have argued that arts integration promotes cognition (Efland, 2002; Deasy, 2002), enhances learning and creativity (Marshall, 2005, 2006), contributes to connection-making and cultural competency (Goldberg, 2001), and aligns with inherently multi-modal properties of intelligence (Gardner, 1983). Some researchers have seen integration as a way to move the arts from the margins of school



curricula to the core curriculum (Krug & Cohen-Evron, 2000), to change the stigma of the arts as “special” and separate, and to break down the compartmentalized walls of current disciplines toward cross-disciplinary inquiry. Others have promoted arts integration as a way to combat the fragmented and disparate curricula that students experience in high schools (Sahasrabudhe, 2006; Taylor, Carpenter and Morris, 2006). At the same time, Mishook and Kornhaber’s research (2006) reported the disparity in quality of arts integrated programs. Arts schools using integration were more likely to engage in coequal, cognitive, arts integration whereas non-arts schools and those with a higher level of poverty often had a subservient use for the arts in the curriculum. Arts integration used in the latter schools’ practices did not promote the cognitive potential and higher-order thinking and deep engagement shown in the coequal arts integrated schools.

Knowledge is constructed through connection-making, and arts learning is enhanced by integration of all subjects. Russell & Zembylas (2007) have claimed that art integration is primarily about connection-making for students. Marshall (2005, 2006) has argued that art as a domain is not devalued by integration; rather, its power and scope are magnified. Connecting art to other areas of inquiry in a substantive, integrative way is congruent with the way the mind works—how we think and learn. It also promotes learning for understanding and transfer, and “catalyses creativity” (Marshall, 2005, p. 229). Krug and Cohen-Evron (2000) advocated for interdisciplinary curriculum integration that focus on meaningful life issues, thereby fostering student construction of informed perspectives in their art studies . The researchers claimed that a life-centered

approach would position the arts as essential to the understanding of human culture and enhance the integrity of art education.

### **Learner-centered Environments and Inquiry**

*“The whole art of teaching is only the art of awakening the natural curiosity of young minds.” Anatole France*

Inquiry and critical thinking as a means to improving student achievement is supported by an expanding body of research about learning and the brain (Bransford et al., 1999; Jensen, 2001; Senge et al., 2000; Stripling, 2003). Inquiry processes engage students in asking and answering questions, solving real-world problems, confronting issues, or exploring personal interests. Research shows that higher-order thinking is associated with inquiry and students’ self-monitoring of their thought processes (Bransford et al., 2000; Collins & Stevens, 1982; Marzano, 2003). In the development of students who are more self-directed learners, it is important to allow students to generate and ask questions; they build higher-level thinking skills and knowledge in this way. Students also assume a higher level of agency and more ownership in their learning (Grabinger & Dunlap, 1995; Scardamalia & Bereiter, 1991).

John Dewey (1933), along with those more classically aligned (Sayers, 1947), recognized that teaching student how to think may be more important than teaching them what to think. Diane Halpern (2006) claimed that the best education for life in the 21<sup>st</sup> century must be built on the twin pillars of learning how to learn and how to think critically about the vast array of information that confronts students. Other researchers have found value in nurturing students’ dispositions for learning in such a way that they become directors of their own learning, and thereby build 21<sup>st</sup> century “learning power”

(Claxton, 2002, p. 1). Chris Argyris (in Senge, 1990) has warned against learning systems that make questioning and open conversation so high risk for individuals that they develop a sort of “skilled incompetence” (p. 25). Senge (1990) lamented that it is often schools that “train us never to admit that we do not know the answer” and argued for 21<sup>st</sup> century learning environments that build generative and creative capacities for “new understandings” (p. 25).

Each of the aforementioned notions share constructivist ideals surrounding the importance of teaching students how to ask questions that are thought-provoking and interesting, and that the process of inquiry is more important than an emphasis on rote learning (Sternberg & Williams, 1996).

#### **Socratic models of inquiry.**

Alison King (1994) promoted that whether utilizing inquiry methods independently or in groups, the Socratic Method of questioning supported students’ abilities to consider multiple perspectives on an issue, leading to higher-order cognitive processes. King’s research has also shown that students’ qualities of thinking are only as good as the questions that are asked, indicating a need for inquiry-based learning and teaching. Inquiry-based projects are usually driven by the learner’s questions, not the teacher’s questions, and are approached from a problem-solving, connection-making stance rather than the more traditional structure of education which is often linear and structured.

Collins and Stevens’ research (1982) shed light on the role of questioning toward leading students to better articulate their thinking through scaffolding. The researchers

looked at how inquiry-based teaching enabled students to move on to higher levels of knowledge and understanding through Socratic methods and modeling. Likewise, Kauchak and Eggen (2006) affirmed the impact of open-ended questioning in safe and supportive environments as a means to encourage student involvement, improve self-perceptions of their learning abilities, and enhance intrinsic motivation. In this way, students build understanding and make sense of the world out of a natural curiosity and desire for truth (Kauchak et al., 2006).

In *Education on the Edge of Possibility*, Caine and Caine (1997) claimed that frequent questioning and expansion of student thinking led to deeper understanding for students. This active processing included “thinking critically, using the Socratic method, asking probing questions, exploring alternative perspectives and points of view, solving problems, recognizing details, and searching for big ideas and broad implications” (p. 12). Since the brain naturally searches for meaning and seeks control, a model of teaching to enhance active processing—whether through the use of discovery learning or project-based learning, basically expands on the brain’s natural tendency. Tsui’s research (2002) confirmed that critical thinking is enhanced by a teacher’s emphasis on classroom discussion, independent inquiry, problem solving, and analysis. Tsui and others (Claxton, 2006a, 2006b; Sayers, 1947) have supported the notion that it is better to teach students how to think, than what to think (Dewey, 1933; Sayers, 1947).

### **Inquiry-based cultures of learning.**

Ritchhart and Perkins (2000) advocated for the affects that classroom and whole-school “cultures of thinking” have on student understanding. In these climates, deep

thinking is valued and nurtured. Claxton (2007) also referred to the ways in which the school as a whole, and classrooms in particular, serve as “epistemic cultures” in which learning capacity is acknowledged, voiced, and purposefully strengthened toward the cultivation of powerful, creative, life-long learners (p. 115). To Claxton, increased academic achievement is a possible bonus.

In environments where curiosity and inquiry are emphasized (Pitri, 2003; Resnick, 1999), greater evidence of creativity, imagination, and divergent thinking have been found (Strom & Strom, 2002). Time given to think, ponder, and reflect, even to prepare responses to questions, is a rare but necessary aspect of promoting thoughtfulness in students and moving them toward higher-level thinking (Ritchhart & Perkins, 2008). Learning environments that are safe places for expressing confusion or asking for more information are important for inquiry-based learning (Lampert, 2006; Wolfe, 2001). Teaching for deeper understanding and “backwards planning” of investigations into underlying and connected meanings has served as a model for inquiry-based pedagogy (Wiggins & McTighe, 2005, p. 19).

### **Inquiry and learning in the arts.**

Nel Noddings (1997) has asserted that an education that “stands the best chance of achieving a meaningful equality” involves serious inquiry into common human problems (p. 29). Noddings proposed a radical shift from an over-emphasis on subject matter knowledge in all areas of the curriculum, to inquiry-based processes using critical life issues that lead to students being more in charge of their own learning and becoming more independent citizens. Art educators and researchers who share in the curricular

priority proposed by Noddings (1997) advocate for a critical theory perspective that promotes synergistic, critical, creative, and practical thinking (Gude, 2007; Walker, 2001). It is not enough, says Olivia Gude (2007, p. 14), to pass on content knowledge and skill in the arts; curricula must also include “a wide range of technical, theoretical, and cultural perspectives.”

As an example of inquiry-based practices, the International Baccalaureate Program (IBP) views the creative process as a “driving force in learning through inquiry” (2009, p. 131). IB art programs are considered a core part of student “investigations of learning” and are considered “essential areas of learning, not added on as optional extras” (2009, p. 131). A formalized curricular arts structure with emphasis on skills and processes are combined with students’ purposeful inquiries into meaningful issues or enduring understandings (Wiggins and McTighe, 2005). The IB arts curriculum honors the process of artmaking, yet allows for students’ questions to direct their arts projects toward the belief that deeper understanding will result.

## **Conclusion**

The research compiled in this chapter has identified the need for new paradigms of intelligence based on new learning theories and the cognitive sciences. It places the development and acknowledgement of more balanced thinking approaches in education in line with needed 21<sup>st</sup> century curricular aims. The historical impact of education policies that promoted an imbalance of thinking skills was also considered. The literature review also served to bring light to current insights into the complexity of learning, the brain, and the complementary synthesis between cognition, knowledge, and creativity.

The research informing this study has provided an alternative framework for balanced thinking and intelligence.

Since the current research encompasses learner-centered teaching and environments within the arts, the domains of inquiry, connectivism, constructivism, and student-directed goal setting have been investigated. The literature surrounding critical, creative, and practical thinking has also served to ground the current study in terms of balanced thinking. Of particular emphasis has been research involving the synthesis of these three modes of intelligence: critical, creative, and practical, and their contribution to quality thinking as balanced thinking.

From the literature review, a number of highlights emerged regarding learning in the arts as training for critical, creative, and practical thinking, as well as the need for research in these areas. The literature regarding contributions of learning dispositions to overall quality thinking also reveals important contribution of the arts in education. Research surrounding a design thinking approach is investigated as a possible link between curricular aims which dichotomize practical and critical skills with creativity. Other research links to the current study's inquiry into student thinking in the arts has led to research surrounding student motivation, self-efficacy, agency, and connections in these self-defining areas.

### **Chapter 3—Methods and Research Design**

Despite recent claims, nationally and internationally, for the need for education to train for critical, creative, and practical thinking (Bransford et al., 2000; Silva, 2008; Sternberg, 2008), little research has been published to show the impact that art and design training has on improving qualities of thinking. Improvement of thinking in education is widely studied, yet we seem to know very little about how various pedagogies and teaching environments in art classrooms affect students' qualities of thinking.

Understanding the environments which produce higher quality thinking is needed. The researcher's former experience as a designer, educator, and administrator led to an observed need for fostering a balance of students' critical, creative, and practical skills and dispositions. Additionally, although recent literature links learning potential with students' beliefs about their intelligence and influence on individual agency and performance, very little has been reported as to how this connection affects students' perceptions of their thinking in arts classrooms. Thus, the research questions guiding this inquiry were:

1. Is there a difference in the quality of thinking skills of art and design students in classrooms that are designed to foster inquiry, connection-making, and self-directed learning and those that are less so?
2. How do students perceive their intelligence and understanding of a subject in these classrooms?



## **Purpose and Significance of Study**

The study explored the difference in students' qualities of thinking in art classrooms which implement a greater degree of balance toward learner-centered practice (inquiry, connection-making, and self-direction) compared to those that implement the same frameworks to a lesser degree, if at all. Learner-centered teaching practices, as described for this research, are intentional in creating a balance of inquiry, connectionism, and student direction (e.g., some degree of choice or autonomy). Learner-centered classrooms also reflect 21<sup>st</sup> century learning goals which foster a dynamic balance of creativity, innovation, and real-world sensibility as identified in Sternberg's theory of successful intelligence (Sternberg, 1985; Sternberg & Grigorenko, 2004). Results from this study may serve to inform teachers and supervisors about quality art instruction as it aligns with 21<sup>st</sup> century learning, fostering quality thinking, and learner-centered environments.

The second research question seeks to explore students' perceptions of their intelligence and abilities to learn and understand. Greater understanding of learners' self-perceptions in arts classrooms meets the call for research in this area by Winner and Hetland (2000). The inquiry into learner perception also seeks understanding into the ways in which personal belief systems about capabilities and intelligence drive motivation and effort, which in turn drive learning goals and overall achievement (Winner & Hetland, 2000b). Possible connections are sought between increased self-efficacy, confidence, and desire to learn and art and design classrooms that emphasize inquiry, self-direction, and constructivism.

The current study aspired to contribute to existing knowledge on quality thinking as defined through balanced intelligence and learning (Sternberg & Grigorenko, 2004), together with students' depth of knowledge (Webb, 2005). While most studies on thinking have been approached in terms of the degree of growth of students' thinking, this study focused on the potential effects of learner-centered environments on the quality of students' thinking. Prior research tended to focus on the study of thinking skills through standardized test measures and a narrow definition of student success (Sternberg, 2008), while qualitative measures have been underutilized (Tsui, 2002). This study analyzed both qualitative and quantitative data to illuminate the conditions in which students' quality of thinking in art classrooms were enhanced.

Lastly, the current study contributed to the recommendations for research in the arts as to how inquiry-based and process-based classrooms may contribute to student achievement (Winner & Hetland, 2000b). The attention in this research given to possible impacts of learner-centered classrooms on student thinking quality met this challenge.

### **Choice and Purpose of Method**

This study utilized a mixed model research method called Sequential Exploratory Design, outlined by Plano Clark and Creswell (2008, p. 179-180). The chosen mixed model design served to explore the impact of learner-centered teaching and learning environments on students' quality of thinking in visual art classrooms. Sequential analysis of both qualitative and quantitative data sources provided a deep and rich understanding, or elaboration, of the variables and their relationships (Plano Clark & Creswell, 2008; Tashakkori & Teddlie, 1998, p. 126). Mixed model designs are

distinguished from mixed methods. Mixed methods combine qualitative and quantitative approaches in the research methods stage of a study, especially in the data collection stage. Mixed model studies can combine quantitative and qualitative approaches throughout all the several different stages of the research process (Creswell, 2002; Tashakkori & Teddlie, 1998).

The purpose of the chosen sequential, exploratory design was to use quantitative data and results to assist in the interpretation of qualitative findings, and vice versa. Unlike the sequential *explanatory* design, better designed to explain relationships and findings, this research design explored elements of a developing theory and aided in the development and testing of several instruments resulting from observation and other qualitative phases. In the mixed model design, the collection of both qualitative and quantitative data from multiple data points helped to confirm, better explain, or elaborate on the quantitative results, providing complementarity (Creswell, 2002; Johnson & Onwuegbuzie, 2004). By combining qualitative and quantitative findings and transforming qualitative data into numeric ratings (Plano Clark & Creswell, 2008, p. 234), all variables were included in the final analyses, providing triangulation.

### **Sampling Design**

A purposive sampling design was aimed at achieving maximum variation (Lincoln & Guba, 1985) in order to capture and describe the central themes or major outcomes in quality student thinking, as experienced in less or more learner-centered classrooms. The “phenomena of interest” (Plano Clark & Creswell, 2008, p. 155) provided the sampling frame: middle school art classrooms (6<sup>th</sup> - 8<sup>th</sup> grade) that fostered

quality thinking to a greater or lesser degree. The comparative design led to the decision that classrooms would be placed in a continuum rank order (0-5) by levels of learner-centeredness as compared against students' balanced intelligence scores (as a class).

The sample of five classrooms came from a large, suburban, school district that emphasized 21<sup>st</sup> century critical thinking and creative problem solving—an important factor to this study. The district supported art programs with qualified instructors and was convenient to the researcher's location. Homogeneity was provided, as all of the schools were public schools that were similar in size, student population, student age, and socioeconomic levels. All of the schools operated on a traditional or conventional calendar. The average age of the middle school students in this study was 12.73 years, with real ages ranging from 11 to 15. Seventy-eight percent of students identified themselves as Anglo American/Caucasian/White; 1.2% as Asian American/Pacific Islander; 7.1% as Hispanic, Latino, Mexican American; and 12.9% as Other. Forty-three point five percent of the total sample were male students and 56.5% were female students (n=85).

The sampling plan was purposive in the researcher's intent to produce comparison cases, which are "at the very core of QUAL [qualitative] data analysis strategies" (Plano Clark & Creswell, 2008, p. 204). The schools chosen to be in the study provided a comparative and appropriate sample, which was relative to the research question and allowed the researcher to focus on the depth of information that was generated by the cases. It is worth noting that while the sampling plan was purposive, middle school teachers ultimately self-selected into the study.

Plano Clark and Creswell ( 2008) have addressed the frequently overlooked qualitative assumption of representativeness (or comparability) in sampling. In this study, variability was accommodated for and representativeness was addressed, in that sampling was “based on a specific purpose rather than randomly” (Tashakkori & Teddlie, 2003, p. 713). It was intended that purposive sampling would also provide more meaningful inference and applicability to other cases.

### **Site Selection and Participants**

Upon obtaining district approval, the final selection of data sites (classrooms of arts students) was based on survey scores of completed surveys and willingness to participate. The survey (Appendix B) was sent to 20 middle school art teachers (6<sup>th</sup> - 8<sup>th</sup> grade) in one school district that concerned itself with training for 21<sup>st</sup> century critical thinking and learning. Schools scoring highest on the survey and schools scoring lowest on the survey were sought in order to obtain comparative groups. The survey addressed five indicators of learner-centeredness and quality thinking as defined for this study and specific to the research question: connection-making, self-direction, inquiry-based practices, depth of learning, and overall balance in the learning environment. For the purposes of this study, these indicators intentionally served as collective evidence to identify classrooms that supported a culture of thinking to a greater or lesser degree (Ritchhart, 2002, Richhart & Perkins, 2000).

Links to the surveys were sent by email through the district central office in cooperation with the researcher’s desire for optimal success, quicker feedback, and ease for the teachers. On the survey, teachers were asked to “participate in a research study

regarding students' thinking in the classroom" and to complete and return the survey if they were interested in being in the survey and willing to be contacted by the researcher. In this way, five teachers self-selected to be involved in the study and agreed to participate. Informed consent letters were obtained from parents and teachers (Appendix A), and students were assured of optional participation with no affect on their grade.

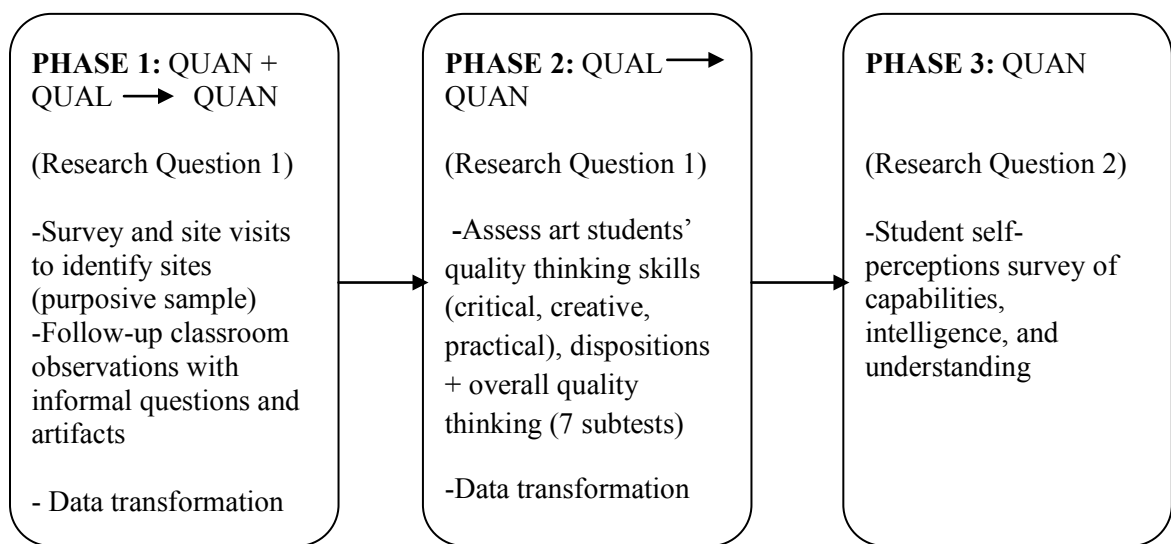
Research participants were students from grades 6<sup>th</sup> through 8<sup>th</sup> middle school classrooms. Visual art classrooms included for consideration were: graphic design, photography, art and design, painting, drawing, and/or 3-D arts classes. Middle school students were the focus of the study as the thinking qualities of middle school students have been less studied in research. It is also important to understand the impact of teaching environments on students' thinking skills and their self-perceptions about education at this pivotal age.

### **Data Collection Overview**

Data for the research questions of this study were gathered in three phases (Figure 3). Data for Research Question One were collected during the first two phases, and data for Research Question Two were collected in the third phase.

Data for Phase One of this study were for the purpose of site selection and were first gathered from surveys distributed to 20 art teachers within two school districts. The survey assessed the degree to which an art classroom values and fosters high-quality thinking in their classroom and provided comparative data for site selection. The survey asked if teachers were willing to be involved in a research study regarding students' thinking in the classroom. Survey responses were recorded using a web-based survey

system, and survey coding was used to assign numerical data to the teachers' responses. The schools scoring lowest on the survey and the schools scoring highest on the survey were considered as possible sites. An initial observation served to confirm comparative sites. Teachers were informed about this confirmatory visit when self-selecting and returning the initial survey. The final selection of classrooms was based on survey scores and observations to arrive at an overall score of learner-centeredness for each classroom.



*Figure 3.* Three Phases of Sequential Mixed-Model Research Data Collection

Data for Phase Two consisted of a series of seven sub-tests designed to assess arts students' qualities of thinking in three domains: (1) analytical, creative, and practical skills, (2) analytical, creative, and practical dispositions, and (3) overall quality of thinking in contextual action. The assessments were administered throughout the course of a semester (approximately 16 weeks) and consisted of both qualitative and quantitative data that were assigned numeric numbers and merged toward an overall score for each

classroom. Data for Phase Three (Research Question Two) were collected through a student-oriented questionnaire. The three phases are illustrated in Figure 3.

**Levels of Data Collected**

A multi-level approach to data collection and analysis allowed for deeper exploration into how learner-centered classrooms—and the degree to which they were designed to be so—impact students’ quality of thinking defined in terms of balance, depth, and complexity. Table 1 lists the types of data collected at the level of each participant. Data levels can be viewed according to three units of analysis: classroom level indicators, teacher level indicators, and student level indicators. This approach allowed for the identification of varying perspectives and the utilization of teacher expertise with respect to some of the indicators. An overview of the instruments used in this study and the type of data explored by each. Table 1 provides a guide for triangulation of data.

Table 1

*Data Types by Level*

| <b>Classroom/School Level<br/>(conducted by Researcher):</b>                   | <b>Teacher Level:</b>  | <b>Student Level:</b>   |
|--|--|---|
| -Follow-up observation   | -18-question survey regarding thinking and learning in arts classrooms   | -Multiple choice/written answer Critical Thinking Skills assessment (CTS) |
| -Observations of class using Overall Quality of Thinking assessment (OQO)      | -Teacher rating scales completed for each student on (Practical Thinking Skills (PTS) & Creative Thinking Dispositions (CTD) | -Self-rating scale for Practical Thinking Dispositions assessment (PTD)   |
| -Critical Thinking Skills assessment (CTS) conducted consensually with teacher | -Critical Thinking Skills assessment (CTS) conducted consensually with teacher   | -Opinion survey on students self-perceptions about their learning (MALS)  |



## Data Collection: Phase One

An eighteen item Likert-type survey (QUAN), created by the researcher for the purpose of sample site identification was designed based on parameters set forth by the first research question. Items within the survey were developed consisting of two questions relating to demographic information and 18 questions relating to indicators pertaining to the research question: (1) evidence of connection-making, (2) evidence of student self-direction, (3) evidence of inquiry-based practices, (4) depth of learning, and (5) content focus and balance.

The survey was based on the inquiry at hand, in order to “flush out” classrooms as indicated in the first research question—those that would have a good degree of reliability for showing inquiry-based, connectivist, and constructivist teaching and learning practices. Questions corresponded to scores on a 4-point scale, and participants marked a “bubble” for increased accuracy of the answers. The indicators, seminal researchers, and terminology embedded in the literature used to compose the items in the survey, are found in Table 2.

Table 2

### *Indicators for Learner-Centered Instruction*

| <b>Survey Instrument Indicators</b> | <b>Seminal Author(s)</b>  | <b>Example Indicators</b>  |
|-------------------------------------|---|--|
| <b>Connection-making</b>            | Bransford et al., 2000; Caine & Caine, 1994, 1997; Dewey, 1963; Gardner, 1983, 2007; Goldberg, 2001; Marshall, 2005; Mishook et al., 2006; Resnick, 1999; Ritchhart & Perkins, 2000 | Mind-mapping, interdisciplinary, cross-disciplinary, personal connections (dreams, ideas, goals), ideation, synthesis, conceptual agility, construction of knowledge, constructivism |
| <b>Student-directed</b>             | Bransford et al., 2000; Bailin et al., 1993; Crabbe, 1993; Grabinger &  | Student-centered, choice, goal-setting, self-assessment, self-organization, time   |

| <b>Survey Instrument Indicators</b> | <b>Seminal Author(s)</b>   | <b>Example Indicators</b>  |
|-------------------------------------|--|--|
| <b>Learning</b>                     | Dunlap, 1995; McCombs, 1994; McCombs et al., 1997; Resnick & Hall, 1998; 2005; Twining et al., 2007  | management, teamwork, technology, student responsibility, constructivism   |
| <b>Inquiry-based</b>                | Caine & Caine, 1997; Dewey, 1933; Claxton, 2006a; Grabinger et al., 1995; Halpern, 2006; Kauchak et al., 2006; Resnick & Hall, 2005; Ritchhart, 2002; Tsui, 2002; Stripling, 2003                                      | Questioning, process-based, investigations, “big ideas,” cultures of inquiry, critical issues, Socratic Method, reflection, metacognition, constructivism  |
| <b>Depth of Learning</b>            | Anderson & Krathwohl, 2001; Bailin et al., 1999; Gardner, 2007; Halpern, 1996; Lipman, 2003; Moseley et al., 2005; Resnick, 2005; Resnick & Hall (2000); Ritchhart, 2002; Stiggins et al., 1988; Webb, 2005            | Learning held to a standard; depth of knowledge; goals for thinking; visible demonstrations of understanding, visible thinking, learning that is complex, flexible, & synthetic; higher-order thinking (i.e., from opposing views, abstracting thought); |
| <b>Content Focus/Balance</b>        | Burnette, 2005; Lipman, 2003; Resnick & Hall, 2000; Sternberg, 1999, 2003; Sternberg & Grigorenko, 2000; Sternberg, Torff, & Grigorenko, 1998; Ritchhart, 2002; Ritchhart & Palmer 2003; Zemelman, Daniels & Hyde 2005 | Balanced thinking (critical, creative, practical), process + product (vs. emphasis on final product only); creative thinking skills are emphasized (not taken for granted)   |

The Phase One survey was pretested previous to the distribution using education professionals holding a Master’s degree or higher, but not directly associated with the research. Feedback was provided on survey items and their overall effectiveness.

**Phase one: Follow-up observation.**

Survey results were followed by researcher-conducted observations in each teacher’s classroom that had self-selected and expressed interest in being involved in the study by submitting the survey. In order to confirm and provide additional evidence as to a classroom’s level of learner-centeredness, each classroom was rated on a scale from 0 (equaling no evidence) to 3 (strongly evident) using a rubric-style assessment. The assessment tool created for this purpose (Appendix C) aligned with the pre-determined

indicators of learner-centeredness as dictated by the first research question and supported theoretical constructs surrounding quality thinking. This confirmatory visit validated a sampling frame consisting of more learner-centered and less learner-centered classrooms. At this time, teachers were asked 2-3 questions based on pre-determined indicators for learner-centeredness.

The observation rubric created to assess classroom's level of learner-centeredness aligned with the same indicators of the initial survey, lending to the study's internal validity. The following pre-determined factors served as visible evidence of criteria noted in the first research question and directly informed the created observation tool

(Appendix C):

1. Connection-making opportunities for interdisciplinary and personally meaningful investigations into big ideas and prior learning
2. Student-directed learning as evidenced through meaningful choice, a degree of autonomy in learning and responsibility, and student planning or goal-setting
3. Inquiry-based practices that emphasize curiosity, reflection, discussion, listening, Socratic or other methods of inquiry, and personal investigations
4. Depth of Learning as seen through a rigorous curriculum, opportunities for complexity of thinking, deep coverage of a topic (versus superficial), and student work that is held to a standard
5. Content Focus and Balance as evidence through synthesis of critical, creative, and practical thinking, evidence of constructivist practices, and creativity being balanced with real-world craftsmanship and quality

These criteria were informed by previously developed research-based tools that emphasize learner-centered practices, cultures of thinking, and depth of thinking and learning (Resnick & Hall, 2000; Webb, 2005; Zemelman, Daniels, & Hyde, 1998). The observation tool for "assessing cultures of thinking" developed by Harvard University's

Project Zero visible thinking study served as a primary resource (Ritchhart & Palmer, 2003). Other empirical, learner-centered, research projects were used in the creation of the assessment tool and design, including:

- University of Pittsburgh's *Principles of Learning* (Resnick, 1987, 2005): knowledge-based constructivist principles for fostering cognitive development and understanding for all students, including: (1) organizing for effort, (2) standards/clear expectations/evaluation, (3) high thinking, (4) active use of knowledge, (5) self-management, and (5) real-world learning;
- Zemelman, Daniels, and Hyde's (1998) "Thirteen Principles of Best Practice" underlying learner-centered, experiential, expressive, reflective, and democratic environments of learning that promote student choice, student ownership and responsibility, connection-making, and inquiry-based processes.

Primary Trait Analysis (PTA) (Walvoord & Anderson, 1998) was used in the accompanying scoring rubric in order to enhance consistency of the criteria (Marzano, 2006) and reliability in the data through specificity (Appendix C). Observable indicators, or traits, were specified and detailed for each pre-determined, identifying factor of learner-centeredness.

Anecdotal notes (QUAL) of the classroom observations were taken by the researcher regarding observed school factors, teacher factors, evidence of visible thinking (Ritchhart & Perkins, 2008), and levels of student engagement and focused effort. The researcher recorded observations such as whether students were involved in making choices in their learning, appeared curious and asked questions, showed evidence of reasoning with evidence, whether creativity was balanced with critical and practical thinking, and the degree of emphasis on process versus product.

Each classroom also received valued-added points for indicators of learner-centered practices as evidenced through the teacher's scoring rubric for the lesson, written objectives, and answers to 2-3 questions asked by the researcher, occurring on the same day and following the in-class observation. The value-added criteria (lesson rubrics and objectives) provided valuable qualitative data as to the degree that the classrooms were intentional in their design for thinking and learner-centered practice, and this aided in greater inner reliability as to the subsequent rank ordering of the classrooms.

The informal questions asked by the researcher were not tightly structured and provided essential additional data early in the process. The researcher sought to better understand teacher's expectations and practices for building quality thinking in the classroom as teachers elaborated on their perceptions of a few of the following guiding topics:

- connection-making (personal, within and between subjects, and use of big ideas);
- student-centeredness (as shown in student choice and learning goals);
- self-direction (as shown in student responsibility to plan/organize, self-assessment of process versus product only, learning goals);
- active versus passive learning (valuing the process, constructivist versus "top down");
- balance of thinking: creative, critical, practical (or design thinking).

#### **Scoring procedures.**

Levels of students' observed skills, processes, and behaviors toward learner-centeredness were recorded using the assessment tool and transformed to quantitative (QUAN) data or "quantitized" (Tashakkori & Teddlie, 1998, p. 308), meaning that

qualitative observations of learning were assigned a numerical value or score. Notes taken at the informal follow-up observations were organized, also quantitized, and combined for a total score for each class. The creation of the rubric-style assessment for this process was described earlier in this chapter.

To clarify, each classroom was assigned a total score for learner-centeredness comprised of both the teacher-reported survey and the corresponding follow-up observation conducted by the researcher. Combined scores ranged from 64 – 95.5. Mean scores were rescaled to 0-3, by dividing total scores by the number of questions for both the survey and the observation rubric for more valid comparability in later correlations to the assessment scores. The survey score and the observation score were given equal weight.

#### **Process of rank ordering of classrooms.**

Each classroom's compiled score was then used to place the classrooms on a continuum rank order as per their degree of learner-centeredness. Continuum rank orders (1, 2, 3, 4, 5) were assigned to each school/class based on each school's combined, quantified scores (5 being the highest). Indicators of both scores (total survey score plus total follow-up observation score) fed into the determination of the rank order of the classrooms and were informed by the same factors of learner-centeredness: (1) connection-making, (2) student self-direction, (3) inquiry-based practices, (4) depth of learning, and (5) content focus and balance. Designated factors were designed to hold equal weight to support the holistic and balanced theory of this study as informed by the literature. The numeric score differences in the sample selection served to achieve

necessary comparability of learner-centeredness between the five classrooms as dictated by Research Question One: “Is there a difference....”

### **Data Collection: Phase Two Matrix of Quality Thinking**

On-site data were collected using a researcher-created assessment matrix of subtests intended to evaluate the three main components of quality intelligence as defined through balanced intelligence: critical, creative, and practical thinking. Models for the design of the “Quality Thinking Assessment Matrix” stemmed from Sternberg and colleagues’ seminal research on successful intelligence which led to the “Rainbow” test (for high school students) and the “Aurora” exam (for middle school students) (Chart, Grigorenko, & Sternberg, 2006; Sternberg and the Rainbow Project Collaborators, 2006).

Both the “Rainbow” and the “Aurora” align with Sternberg’s research on “successful intelligence” (Sternberg, 1999a, 2003, 2008), wherein creative and practical skills are considered as important as the traditionally tested analytical/memory skills. The “Rainbow” exam has been shown to address the diverse nature of students’ abilities and to increase equity in assessing those abilities. A recent study in 13 colleges and two high schools (Sternberg, 2008) indicated that the Rainbow rivaled traditional standardized tests measuring primarily analytical and fact-based skills in terms of incremental predictability of college success, as well as increased equity by reducing differences in test performance between groups.

### **The Assessment Matrix of Quality Thinking**

For the current research, a matrix design of assessments, similar to the “Rainbow” and the “Aurora” batteries (Chart et al., 2006; Sternberg and the Rainbow Project

Collaborators, 2006) was designed to tap into the intelligence sub-areas of analytical, creative, and practical, as they apply to the arts. The matrix design operationalized the theory of balanced intelligence (Sternberg, 2008) in this study. This method of data collection was guided by Research Question One for this study: Is there a difference in the quality of thinking skills of art and design students in classrooms that are designed to foster inquiry, connection-making, and self-directed learning and those that are less so?

The design and content of assessments for each sub-test area were based on reviews of the current literature regarding best practice assessment in each of these sub-areas. Where appropriate instruments to this research study could not be located, the researcher developed the necessary assessments. The following theoretical underpinnings supporting “successful intelligence” (Sternberg, 2008; Sternberg et al., 2006, 1998) were shared by the researcher in the development of the the matrix of assessments for the current study:

Three overarching theories, supported by vast research, were applied in the design of the current assessment matrix:

1. Intelligence is modifiable and expandable. It is flexible, not fixed.
2. Critical, creative, and practical thinking are not completely discrete; they overlap.
3. It is the integration of and connection between thinking areas that leads to quality thinking.

To extend the theories utilized in the “Rainbow,” three other additional constructs were woven into the design of the current matrix of assessments for this research

(continued from above):



4. Quality thinking is accompanied by dispositions that drive students' inclinations to invest mental effort toward quality thinking and as overall predictor of student achievement (Perkins et al., 1993, 2000).
5. Quality thinking and accompanying dispositions are best observed within the context of the subject matter in which they are desired and measured (Halpern, 2006; Perkins et al., 2003; Ritchhart & Perkins, 2000).
6. Quality of thinking is observed through balanced thinking skills, depth of understanding, complexity of thinking, and dispositional engagement—all affected by the thinking culture in which students learn (Ritchhart, 2002; Ritchhart & Palmer, 2003).

Therefore, in alignment with theoretical constructs surrounding the importance of dispositions in overall quality thinking, both skills and dispositions were included in the matrix design for each sub-area (critical, creative, and practical). Although the “Rainbow” assessment was considered for this study (Sternberg et al., 2006), it was deemed less appropriate due to being out of context for the arts. Context specificity was an intentional goal of the current study for adequate measurement of both skills and dispositions.

Lastly, an overall assessment of students' quality thinking was added to the design of the current matrix. While Sternberg's “Rainbow” design included an assessment of overall intelligence (g-factor) together with the critical, creative, and practical domains, it was deemed more appropriate for this study, to assess students' overall thinking in terms of balance and depth, within their thinking culture. It was also important to assess students' overall quality of thinking within a “design thinking” context, which led to the researcher's development of the “T-H-I-N-K Tool for Assessing Quality Thinking in Visual Art Classrooms” (discussed in greater detail in the section explaining the Overall Quality of Thinking [OQO] assessment).

More so than the Rainbow, sub-tests within the Quality Thinking Assessment Matrix were purposefully varied in their design, in order to increase reliability and validity of inferences in student performances (Stiggins, 1987, Wiggins & McTighe, 1998). The design provided a balanced opportunity for students to demonstrate their multiple and varied abilities and dispositions toward an overall measure of quality thinking. Three kinds of abilities: (1) analytical, (2) creative, and (3) practical, were measured along with (4) analytical dispositions, (5) creative dispositions, and (6) practical dispositions. Four assessment types were used: (1) multiple choice with written answer, (2) student self-rating scale, (3) student opinion survey, and (4) teacher and researcher observation rubrics/rating scales. Concern was taken for consistency in the instruments in that all were designed on the same 4 point scale (0-1-2-3), where 0 indicates that the behavior or skill is not observed or present. All researcher-created sub-tests were pretested on art students of the same age, but from a separate school district not involved in the study.

### **Instrument Development and Rationales**

The Quality Thinking Assessment Matrix (Table 3) is illustrated by sub-test used to assess students' thinking skills, dispositions, and overall quality thinking in the areas of critical, creative, and practical intelligence along with supporting research. Using a combination of researcher observation, student multiple choice with written answer to problem-based scenarios, student self-ratings, teacher rating scales, and researcher observation, a balanced picture of students' thinking qualities were assessed.

Table 3

*Quality Thinking Assessment Matrix*

| <b>Quality Thinking Assessment Matrix</b>  |  |  |  |
|--|--|--|--|
| Assessment Method  | Dimension to be Assessed with Research Base  |  |  |
| <ul style="list-style-type: none"> <li>Classroom observation using T-H-I-N-K researcher-created assessment tool (Levels of complexity + knowledge dimension/standards + dispositions &amp; culture) (OQO)</li> <li>Contextually aligned to the arts</li> </ul>   | <b>Overall Balanced Thinking</b><br>[Anderson & Krathwohl, 2001; Beattie, 2001; Burnette, 2002; Ritchhart, 2002; Ritchhart et al., 2003; Webb, 2005] |  |  |
| Critical Thinking Skills: <ul style="list-style-type: none"> <li>Multiple choice/written answer problem-based scenario test (CTS)</li> </ul> Creative Thinking Skills: <ul style="list-style-type: none"> <li>Rubric-style assessment for creative process &amp; product (assessed via Consensual Agreement-CAT) (CvTS)</li> </ul> Practical Thinking Skills: <ul style="list-style-type: none"> <li>Teacher rating scale (PTS)</li> </ul> | <b>Critical Thinking</b><br><br>[Bailin et al., 1999, 1993; Halpern, 2006; Moseley et al., 2005; Paul & Elder, 2006]                                 | <b>Creative Thinking</b><br><br>[Amabile, 1983, 1996; Beattie, 2000; Eisner, 2002; Hickey, 2001; Isaksen et al., 1993; Sternberg & Lubart, 1999] | <b>Practical Thinking</b><br><br>[Sternberg, Torff & Grigorenko, 1994; Gardner et al., 1994]   |
| Critical Thinking Dispositions <ul style="list-style-type: none"> <li>CM3 II+ Critical Thinking Disposition Assessment (Middle school version of CCTDI) (CTD)</li> </ul> Creative Thinking Dispositions <ul style="list-style-type: none"> <li>Teacher-rated rubric assessment (CvTD)</li> </ul> Practical Thinking Dispositions <ul style="list-style-type: none"> <li>Student self-rating scale (PTD)</li> </ul>                         | <b>Critical Thinking Dispositions</b><br><br>[Facione, Sanchez, Facione & Gainen, 2000; Giancarlo et al., 2004; Perkins et al., 2000]                | <b>Creative Thinking Dispositions</b><br><br>[Beattie, 2000; Carr & Claxton, 2002; Claxton, 2006b; Cunliffe, 2007; Perkins et al., 1993, 2000]   | <b>Practical Thinking Dispositions</b><br><br>[Claxton, 2002; Costa & Kallick, 2004; Perkins et al., 1993, 2000; Sternberg, 1999a,b] |

*Note:* Matrix design based on “Aurora” and “Rainbow” assessments (Chart, Grigorenko, & Sternberg, 2006; Sternberg and the Rainbow Project Collaborators, 2006)

Student’s individual scores for each assessment were compiled for consideration of the class as a whole. The collective assessment scores for students in each school/class were merged and quantitized (Tashakkori & Teddlie, 1998, p. 308). Data collection, as

designed for each assessment tool and each assessment's theoretical constructs, will be outlined in the following sections of this chapter.

**Matrix assessment 1: Critical thinking skills assessment (CTS).**

Critical thinking skills were assessed through students' answers to problem-based scenarios in a multiple choice and written answer format (Appendix D). The Critical Thinking Skills assessment (CTS) items were set in authentic and believable contexts where students are given the opportunity to elaborate and defend the reasons for their choices regarding art-based problems. Scenarios were created similar to Halpern's Critical Thinking Assessment (HCTA) (2006), requiring written, open-ended responses to everyday situations, yet in the context of visual art education, and often utilizing visuals of artworks or photographs in test items.

Halpern's critical thinking assessment (HCTA, 2006) inspired the researcher-created multiple choice and open-ended answer assessment which allowed for the measurement of the complex skills involved in five areas of critical thinking: (1) verbal reasoning (recognizing reasons and conclusions in arguments), (2) checking hypotheses, (3) argument analysis (recognizing conclusions and reasons), (4) probability and uncertainty, and (5) decision making and problem solving (as in problem finding and exploring solutions among alternatives). The combination of multiple choice and open-ended items allowed for the measurement of these complex skills. Students were sometimes asked to provide evidence for the reasoning of their claims to show the complexity or quality of their thinking (Adams et al., 2007; Paul & Elder, 2006) with written answers. Written answers were scored using a rubric, grounded by Primary Trait

Analysis (PTS) (Walvoord et al., 1998). Similar to Halpern's design (2006), answers that required "reasoning with evidence" were allowed full credit if well defended.

Test items designated as problem-identification questions (#4a, 8a), were scored with 0 for incorrect or 3 for correct. Answers that required reasoning with evidence received full credit (3 points), if defended using clear, specific, and reasonable support for their assertions or expressed how they arrived at a conclusion. Answers that were clearly made due to a difference of beliefs (as clear in the written evidence portion) were allowed full credit (Halpern, 2006). For greater consistency among the matrix of assessments, both multiple choice and open response items (using a rubric design) were placed on a 4-point scale (0-1-2-3), as with all other assessments.

Indicators of critical thinking used to develop the test items for the CTS aligned with definitions and indicators for critical thinking as determined by the American Philosophical Association's Delphi Report (Facione et al., 2000) and principal research regarding assessment of critical thinking (Bailin et al., 1999, 1993; Halpern, 2006; Moseley et al., 2005, Paul & Elder, 2006). The CTS was developed by the researcher in order to satisfy the need for a critical thinking assessment in the arts that was context-specific, as none could be found. As with other sub-areas of quality thinking, critical thinking is best observed and assessed within the context of the subject matter; the outcome measure and curricular aim should be similar. Ritchhart and Perkin's (2008) evaluation of critical thinking programs showed that the more dissimilarity between the test and the content, the effectiveness of transfer of critical thinking dropped dramatically. The Critical Thinking Skills (CTS) was pretested using middle school

students in a similar district who volunteered to participate. A few items were revised for clarity and readability.

**Matrix assessment 2: Creative thinking skills assessment (CvTS).**

End-of-the-semester products, processes, and performances of student creativity were assessed using a rubric-based tool developed by the researcher to align with select creativity research and theories outlined in this study. The Creative Thinking Skills (CvTS) Assessment (Appendix E) was designed to satisfy the research that a level of expertise be achieved in order for students to be truly creative (Beattie, 2000). The CvTS assessment answers the call for authentic assessment strategies to evaluate student performance (Wiggins & McTighe, 2005).

Clear and consistent performance criteria were based on a review of the literature surrounding creativity and creativity assessment (Amabile, 1983, 1996; Beattie, 2000; Eisner, 2002; Hickey, 2001; Isaksen, Murdock, Firestein, & Treffinger, 1993; Sternberg & Lubart, 1999). Performance indicators included: (1) process (problem finding, planning, and problem solving), (2) perceptual/conceptual growth (meaning-making/expressiveness and connection-making), (3) products (originality, craftsmanship, complexity of thinking), (4) observed dispositions of creativity, and (5) value-added evidence (student research workbooks/portfolios and observed student levels of sustained and concentrated effort. Data were collected using the CvTS rubric, anecdotal notes of observed student artworks and discussions with students regarding their process and their final product, as well as observed evidence of students' visible thinking of the design and

creation process (i.e., sketches, written reflections, notes showing design-thinking process).

Creative dispositions were factored into the scoring design, informed by research finding that creativity is not developed apart from the dispositions to do so (Carr & Claxton, 2002; Claxton, 2006b; Cunliffe, 2007). Cunliffe's research (2007) also identified that creative, self-regulated capacities are best developed in the presence of supporting dispositions.

Students were assessed by the teacher and researcher using the CvTS rubric. Working together, the raters arrived at an agreed-upon rating for each item. This led to a consensual agreement on the final score for each student. The use of Consensual Assessment Technique (CAT) (Amabile, 1983, 1996) in the scoring of the CvTS increased levels of objectivity and accuracy, whereby appropriate and expert judges in the arts (in this case, the teacher and the researcher) confer to assess creative products and processes. Hickey (2001) reported that assessments of CAT type were as reliable, if not more, than closed criterion-defined scales and that teachers, being the most closely involved with students, provided the most dependable assessment of student creativity. This is shown through the high inter-rater reliability of teachers as opposed to other expert raters or students when using the CAT (Hickey, 2001).

### **Matrix assessment 3: Practical thinking skills (PTS).**

A researcher-created rubric for assessing student practical thinking skills (PTS) was used to assess students' practical thinking. Teacher expertise and knowledge about their students was utilized, as they rated each student on a 17-item rating scale. Rating

items for the PTS were developed after consulting the empirical literature on tacit knowledge, practical intelligence (Gardner et al., 1994; Illinois State Board of Education, 2004; Sternberg, 1999a, 2001; Wagner & Sternberg, 1986). As tacit knowledge is largely domain-specific, it was important to design an assessment tool tailored to the visual arts classroom. The researcher could not find an existing assessment tool of this type. Real-world, practical applications of knowledge (about self, tasks, and others), within the context of art and design (Wagner et al., 1986), were included in the development of the CTS. The PTS assessment tool (Appendix F) was largely informed by the Illinois State Department of Education's learning standards for Social/Emotional Learning (SEL) (2004), one of the few States in the United States to have such standards: indicators for benchmarks such as student self-awareness, self-management, decision making, social skills, and conflict awareness. Additional items were written based on research projects by Harvard University's Practical Intelligence for Schools Project (PIFS) (Gardner, Krechevsky, Sternberg, & Okagaki, 1994) and other research regarding tacit knowledge (Sternberg, 1999a, 2001; Wagner et al., 1986).

The six-year Practical Intelligence for Schools Project (PIFS) reported on the role of tacit knowledge in middle school students' school performance. Results of students' involvement with practical thinking curricula showed that those receiving the PIFS curriculum had significantly greater increases in reading, writing, homework, and test-taking ability over the school year, compared with students in the same schools not receiving the curriculum. ANCOVA analyses reported an  $F$  for PIFS variable = 60.89 ( $p$



< .0001). As this study targeted middle school students, its findings were considered for the researcher-developed assessment tool (PTS).

### **Matrix Tools for Critical, Creative, and Practical Thinking Dispositions**

In order to capture the quality of students' thinking, it is necessary to assess the presence of dispositions in relation to the identified thinking skills in critical, creative, and practical domains (Ennis, 1996; Halpern, 2006). Quality thinking is as much a question of "people's attitudes, motivations, commitments, and habits of mind" as it is their cognitive abilities (Perkins & Ritchhart, 2004, p. 352). Students' dispositions will be assessed, respectively, using the following tools:

- Form CM3 II+ (middle school equivalent) of the California Measure of Mental Motivation (Giancarlo et al., 2004) for the critical thinking dispositions (CTD);
- A teacher rating scale for students' creative thinking dispositions in the arts (CvTD);
- A teacher rating scale for students' practical thinking dispositions in the arts (PTD).

#### **Matrix assessment 4: Critical thinking dispositions (CTD).**

Critical thinking dispositions were measured using the Form CM3 II+ (middle school equivalent) of the the California Measure of Mental Motivation (Giancarlo et al., 2004). This 20-item questionnaire analyzed students' attitudes and characteristics describing students' motivation to engage in the effort to learn. The CM3 II+ is derived from the California Critical Thinking Dispositions Inventory (CCTDI) and developed on the same research base (Facione et al., 2000; Giancarlo et al., 2004). This inventory for critical thinking dispositions is widely tested, known for its reliability, supported by validity studies, and has been previously used in studies regarding thinking in art

education (Lampert, 2006). For these reasons it was determined the best means of assessing students' critical thinking dispositions in this study. The researcher's acquisition, use, and interpretation of the instrument met all obligations and responsibilities required by distributors of the CM3 II+ scales. The assessment is referred to as the CTD (critical thinking dispositions) tool in this study for the purposes of easier identification.

The CM3 II+ measured four main dispositional aspects of critical thinking: (1) learning orientation, (2) mental focus, (3) cognitive integrity, and creative problem solving. Learning orientation refers to the motivation to increase one's knowledge and learn for learning's sake. Mental focus refers to diligence, focus, organization, and task-orientation. Cognitive integrity refers to fair-mindedness, seeking truth, and open-mindedness. Lastly, creative problem solving refers to innovative approaches to problem solving, originality, and a desire to understand.

Internal consistency for the CM3 scales in independent samples revealed goodness-of-fit indices (AFGI) ranging from .73-89 and comparative fit indices (CFI) of .77-.90. Reliability estimates for the four dispositional aspects using Cronbach's alpha coefficients ranged from .53-.83 (Giancarlo et al., 2004). The CM3 scales have been positively correlated with standardized test scores and student grade point averages (GPA), confirming research findings that critical thinking skills and dispositions are associated with academic achievement (Facione et al., 2000).

This assessment is on the same 3-point scale, and the publishers of the CM3 II+ suggested that scale scores could appropriately be used for this instrument. Copyright

agreements signed by the researcher for the use of the CM3 II+ prevent the publication or inclusion of this assessment or answer forms in this paper.

**Matrix assessment 5: Creative thinking dispositions (CvTD).**

Students' creative thinking dispositions (CvTD) were assessed using a 10-item teacher rating scale rubric (Appendix G). Carr & Claxton's creative dispositions list (2002), comprising the acronym "C-R-E-A-T-E," led to the development of the current assessment tool, but it was augmented with the disposition of open-mindedness toward the CvTD "C-R-E-A-T-O" acronym. Open-mindedness was added to the CvTS rubric to accommodate primary literature linking creativity to being open-minded and adventurous (Gardner, 1993; Hetland et al., 2000; Ritchhart, 2002; Silvia, 2007).

In part one of the CvTS rubric-style assessment, teachers assigned students two scores for the dispositions of (1) curiosity, (2) resilience, (3) experimenting, (4) attentiveness, (5) thoughtfulness, and (6) open-mindedness. The first score was for the strength or robustness of the observed disposition (i.e., how often or how strongly a student is curious or thoughtful). The second score recorded the complexity or sophistication of the disposition (i.e., the degree to which a student is curious). The second part of the assessment was based on seminal creativity research by Beattie (2000), for the inclusion of students' dispositions toward tolerance, flexibility, intuitiveness, and perceptual alertness. This is to satisfy the research showing that creativity is not observed apart from dispositional elements (Claxton, 2002; Robinson, 2001; Sternberg & Lubart, 1994).

The particular dispositions chosen for inclusion in the CvTS was also informed by: (1) the *Artful Thinking* framework of Project Zero (Tishman & Palmer, 2006), which utilized visual thinking strategies (VTS) and other thinking routines for developing students' habits of mind; (2) Hetland, Winner, Veenema, and Sheridan's "Studio Thinking" project (2007) which revealed eight important and potentially generalizable habits of mind; and (3) Sternberg & colleagues' proposal (Sternberg, 2003b; Sternberg & Lubart, 1999; Sternberg & Williams, 1996) that certain dispositions are important for creative thought and action, allowing a person to decide to be creative. In sum, creative ability involves attitudes, motivation, and personality motivational components as well as cognitive intelligence. In many ways, creativity is a decision (Claxton, 2002; Robinson, 2001; Sternberg & Williams, 1996).

#### **Matrix assessment 6: Practical thinking dispositions.**

The Practical Thinking Dispositions (PTD) assessment consisted of a 10-item student self-rating scale regarding practical thinking dispositions in the arts (Appendix H). The tool is primarily informed by Claxton and colleagues' empirical research (Claxton, 2002, 2006a, 2006b; 2007; Carr & Claxton, 2002) into key practical learning dispositions that affect and expand students' overall capacity to learn and achieve. Claxton's key dimensions of "learning power" (2006b, p. 10) led to a list of "positive learning dispositions" (2006, p. 6), framed by the four "Rs" of resilience, resourcefulness, reflection, and reciprocity (relationships). His work in the United Kingdom led to the development of the international *Building Learning Power* program (TLO, 2004), which emphasizes systemic educational system change as supported by extensive research into

building learning power (Claxton, 2002) and cognitive neuroscience. These philosophical tenants were in alignment with reviews of the literature presented in this study.

The Practical Thinking Dispositions assessment (PTD) designed for this research included 10 self-statements based on Claxton's (2006b) four key positive learning disposition indicators: resilience, resourcefulness, reflection, and reciprocity/relationships. Students rated themselves on the 10 items using a 4-point scale, with "0" indicating "never" and "3" for "always." At the student level (see Table 1), the PTD provided variability in assessment types and tapped into student self-knowledge about their abilities for being ready, willing, and able (Claxton & Carr, 2004; Claxton 2006b) to utilize their practical dispositions. The Practical Thinking Dispositions (PTD) self-rating scale was pretested using middle school students in a similar district who volunteered to participate.

#### **Matrix assessment 7: Overall quality thinking (OQO).**

Reviews of the literature surrounding quality thinking, Sternberg's "Rainbow" matrix, and data collected through observations in the classrooms at early stages of the research process led to the author's development of the Overall Quality Observation (OQO) tool (Appendix I). Instead of utilizing a measure of general thinking (g-factor) in the matrix, as was done with the "Rainbow" exam design, it was deemed more appropriate for this study to assess visual art students' thinking competency for overall quality within the context of the culture in which they learn. Factoring in an assessment of students' overall quality of thinking took into account the research indicating that if only single aspects of intelligence or discrete skills are assessed, the risk increases for

successfully capturing either the quality of that thinking or the relation of the identified thinking skill to the tasks being assessed (Moseley et al., 2005). To increase the OQO's validity, the definition of quality thinking for this study was directly applied in the creation of the tool: thinking that is a balance of critical, creative, and practical skills and dispositions, used with complexity as held to a standard, and leading to depth of understanding.

Norman Webb's "Depth of Knowledge" (DOK) indicators (2005), McDaniel's "Levels of Cognitive Complexity" continuum (1991), and Anderson and Krathwohl's revision of Bloom's educational objectives taxonomy (2001) served as conceptual frameworks and informing models for the developed research tool. A review of the literature provided supporting theory statements regarding requirements for quality thinking (Bailin et al., 1999; Bransford et al., 2000; Ennis, 1996; Perkins, 1998, Webb, 2005), including the following:

1. Quality thinking requires a rating against the standard being met
2. Thinking must be moving toward a target or standard that is relevant to both the end product and the process of a given area of inquiry

***OQO cognitive complexity levels.***

Cognitive complexity levels were arranged, not in hierarchical order or difficulty, but by depth of required thinking (Figure 4). The acronym, "THINK" was used to label and define each dimension, assigning levels of complexity toward students' higher-order thinking and expectations for students' observed action at each level, including:

1. T: engage *thinking* (to recall, define, and observe)
2. H: have a plan (set learning goals and organize)

3. I: investigate (make connections and explore)
4. N: generate *new* ideas (create and attach meaning)
5. K: know or understand (synthesize, elaborate, and reason with evidence)

The cognitive processing levels represented can be simplified into three strands (Figure 4). Level one involves “information gathering;” levels two and three involve “gaining more understanding,” and levels four and five represent “more productive and complex thinking” (McDaniel, 1991). Levels four and five also involve deeper understanding and/or metacognitive complexity, as inspired by revisions of Bloom’s taxonomy (Anderson & Krathwohl, 2001).






| <b>T- H-I-N-K Tool for Assessing Qualities of Thinking</b>  |  |  |  |  |
|---|--|--|--|--|
| <b>Cognitive Process Dimensions</b>   |  |  |  |  |
| Level 1:<br>Think<br><br>-Engage<br>-Recall/recognize<br>-Basic questioning<br>-Perceive & define (no supporting facts required)<br>-Observe | Level 2:<br>Have a Plan<br><br>-Plan<br>-Set goals<br>-Organize<br>-Arrange and classify information<br>-Compare & contrast | Level 3:<br>Investigate<br><br>-Analyze (errors, ideas; pts. of view)<br>-Induct/Deduct<br>-Break into parts<br>-Consider possibilities<br>-Make connections (to self & others)<br>-Explore | Level 4:<br>New Ideas<br><br>-Create<br>-Generate<br>-Attach meaning to creations<br>-Problem solve<br>-Share ideas<br>-Instill a plan<br>-Consider “why” /interpret | Level 5:<br>Know<br><br>-Reason with evidence<br>-Synthesize critical + creative (parts to form new whole)<br>-Self-evaluate<br>-Self-reflect<br>-Elaborate understanding |
| 3 Cognitive Process Strands:  |  |  |  |  |
| <b>Information-gathering</b><br>(perceiving and defining)   | <b>Gaining more understanding</b><br>(imposing/organizing structures)  |  | <b>More productive/complex thinking</b><br>(analyzing, supporting, elaborating)  |  |
| ← Dispositions for strategic and reflective thinking →  |  |  |  |  |

Figure 4. Cognitive Complexity Levels and Strands

***OQO knowledge and cognitive process alignment.***

The OQO assessment, or “T-H-I-N-K tool” as it came to be called, was designed by the researcher to evaluate the quality of students’ overall thinking by measuring the kind of knowledge to be learned (the knowledge dimension), along with the the depth of

knowledge (DOK) or complexity of thinking being used (the cognitive process dimension) as students were held to a standard (Anderson & Krathwohl, 2001; Webb, 2005). More specifically, the overall quality thinking tool enabled the determination of the *alignment* between these two dimensions: the knowledge dimension (factual, conceptual, and procedural) and the depth of a student's thinking (complexity level/cognitive process dimension) (Webb, 2005). For this study, the types of knowledge assessed paralleled the balanced thinking dimensions: critical, creative, and practical.

Classrooms were assigned a second score in each knowledge dimension (factual, conceptual, and procedural). This score involved the level of expectation, or the robustness, to which students were held to a standard. On the OQO assessment tool, this score was labeled as “depth of rigor,” and classrooms/students received higher scores when the standard to which they were held was of a more complex nature (factual, conceptual, or procedural). It was recognized that not all standards/objectives are the same, and that learning involving more robust expectations of students, should be rewarded. In this way, achievement was matched to quality thinking in terms of complexity and held to a standard in both process and product (Bailin et al., 1999; Webb, 2005).

In review, the cognitive process dimensions (degree of complexity of thinking) and knowledge dimensions (type of knowledge learned) were measured in two ways: (1) for alignment/degree of complexity of thinking, and (2) for robustness or “depth of rigor.” The OQO assessment model rewarded high expectations and took into account the complex and interdisciplinary nature of learning and the brain. The OQO rubric made a



distinction between the complexity of thinking required between lower and higher-order processes without being hierarchical; some processes require more depth than others (Stiggins, Rubel & Quellmalz, 1988).

***Other OQO indicators: Dispositions and culture.***

While it was vital to assess the complexity of students' thinking in alignment with knowledge dimensions, it was equally important to consider dispositional elements of students' learning as well as the degree to which their culture of learning impacted their thinking quality. Students received scores for both dispositions and the construct of culture. The OQO assessment tool took into account the learner's control of his or her own thinking and the role of dispositions in acquiring knowledge. The depth to which students' thinking about a subject was expected was also evident in students' observed dispositions for learning—whether students were curious, open-minded, tolerant of ambiguity, or others. Dispositional elements were observed through students' levels of sustained, concentrated attention, their use of thinking words, their awareness about their thinking and their internal motivation. Assessing the dispositional factor toward depth of thinking and sustained concentration was deemed to be different from students' initial willingness or inclination to use their skills (Claxton, 2002).

Primary traits for the alignment between knowledge dimensions and cognitive process dimensions were assigned using predetermined indicators, thereby increasing application consistency of the criteria across the schools. The primary trait analysis (PTA) rubric for the OQO assessment (Appendix I) served to increase the reliability of the researcher's observations and score determinations (Walvoord et al., 1998). Primary

research frameworks and models that served as key informants toward analysis and scoring purposes included:

- Anderson and Krathwohl's revision of Bloom's 1956 taxonomy of Cognitive, Affective, and Psychomotor Domains of Learning Skills (2001)
- Webb's cognitive complexity standards (depth of knowledge) (2005)
- The "Design for Thinking" framework (Burnette, 2005; Burnette & Norman, 1997), an art and design-based education model for curriculum design and instruction that is interdisciplinary, self-directed, exploratory, collaborative, and critical + creative (in balance).

Data was reported for the class as a whole, based on the researcher's observations of the complexity to which students' thinking was met in each of the knowledge dimensions: factual/critical, conceptual/creative, procedural/practical, dispositional, and cultural.

#### **Data Collection: Phase Three Survey (MALS)**

The final phase of data collection consisted of a student survey regarding their self-perceptions about learning and thinking. The assessment consisted of 20 self-statements that, when viewed together, gave a single measure overview of students' self-concepts about themselves as learners and problem solvers. Theoretical frameworks supporting intelligence as a multifaceted system and the influence of self-beliefs, self-efficacy, and motivation on student learning were driving factors in the overall inclusion of this data in the present study.

Burden's Myself-As-A-Learner-Scale (MALS, 2000) was chosen as an appropriate method of answering Research Question #2 for this study: How do students perceive their intelligence and understanding of a subject in these classrooms? The researcher desired to gain insight into students' perceptions of themselves as learners in classrooms designed to be more or less learner-centered (Appendix K). The MALS items addressed various aspects of students' self-concepts such as confidence in their abilities, their desire to learn, problem solving, and their perceived learning style. Although the MALS was no longer available from the publishers, the assessment was used by permission upon communication with the author. Burden's report (1998) on the development and analysis of the MALS includes the instrument.

The MALS was also chosen for its known validity, reliability, and correlation with cognitive ability. The MALS scale has a known alpha reliability index of 0.846 and has shown statistically significant correlations (.001 level) with other measures of cognitive abilities tests for verbal reasoning, non-verbal reasoning, numerical ability and reading ability (Burden, 1998). These correlations indicate that high MALS self-ratings hold a relatively strong positive relationship with measured cognitive ability, including reading and mathematical computation abilities. The MALS scale has also shown statistically significant (.001 level) measures of validity with previously tested subscales of internal and external cognitive control (Burden, 1998), suggesting that high self-ratings on the MALS also correlate with students' stronger perceptions of their overall control of their learning.

The assessment was adjusted to a 3-point scale (0-1-2-3) for consistency with the other instruments used for this research, which were set on the same 4-point scale. As true to the MALS (Burden, 1998), 0 indicated that a statement was “definitely not true,” and 3 indicated “yes, definitely true.” Five items were negatively worded and scored in reverse order, “to avoid counter response bias” (Burden, 1998, p. 297). Slight adjustments were made to the wording on three items in the current study, in order to accommodate the visual art context in which this assessment was presented. For example, “discussing things” was replaced with “making things,” and “work” was replaced with “art work.”

#### **Data Collection Timeframe**

The data for this study was collected over the period of a school semester. Overlapping of the weeks that assessments were administered was intentional to allow flexibility to the teachers involved in the study. An indication of the time allotted for the overall Quality Thinking Assessment Matrix with time allotted for individual sub-tests is depicted in Table 4.

Table 4

*Timeframe of Assessment Matrix and Sub-tests*

| Weeks 1-3  | Weeks 4-8  | Weeks 6-10  | Weeks 8-12  | Weeks 13-14   |
|--|--|---|---|---|
| <b>Phase One:</b>  |  |   |   |   |
| - Pretesting of researcher-created instruments<br>-Survey sent to teachers<br>-Follow-up visit |  |   |   |   |
| <b>Phase Two:</b>  |  |   |   |   |
|  |  | Critical Thinking Dispositions (CM3 II+) (25 min. in each classroom)                      | Overall Balanced Thinking Observation (OQO) (1 hr. in each classroom)   |   |
|  | Critical Thinking Skills (CTS)<br>-Problem-based, in-context scenarios (25 min. in each classroom) | Creative Thinking Dispositions (CTD)<br>-In-class observations (1 hour in each classroom) | -Practical Thinking Skills and Practical Thinking Dispositions (PTS, PTD)<br>-Teacher rating scales (done at any time in weeks 10-14) | -Creative Thinking Skills (CvTS) (Creative products & process using CAT) (1 ½ hrs. in each classroom) |
|  |  |   |   | <b>Phase Three:</b>   |
|  |  |   |   | Survey of students' perceptions as learners (MALS) (15 min. in each classroom)                        |

**Data Analysis**

As a mixed model study, analysis was approached as “mixed metaphor” (Plano Clark & Creswell, 2008, p. 328) with a commitment and respect for both the craft and responsibility of reporting quantitative and qualitative results. Descriptive, qualitative analysis provided a richer elaboration of the data in the final analysis. Data analysis methods for the three phases of this study are outlined in the following sections.

Data analyzed for Research Question One consisted of two phases: (1) analysis of data to determine school rank orders, (2) analysis of data for each school/classroom’s overall scores compared to school rank and student age, and assessments to overall scores for each school/classroom.

### **Phase one: QUAL + QUAN data analysis.**

Throughout each phase of this study, qualitative data were mixed with quantitative data, as true to the intended mixed model design (Creswell, 2002; Tashakkori & Teddlie, 1998). A convergence of qualitative and quantitative data provided methodological triangulation, partially reducing systematic bias. Validity was also strengthened through observations which served as both QUAL + QUAN data. Observations and collection of data were monitored for personal bias or prejudice through the use of rubrics and the primary trait analysis method (Walvoord et al., 1998).

Qualitative data were gathered for both survey and initial observation, and analyzed using an open-coding method. The open-coding method used to analyze Phase One data informed the categorization of data, data reduction, interpretation and identification of patterns, recoding and synthesis of all data into identified themes. Data reduction occurred (Miles & Huberman, 1994) through the observation process using rubrics and observation tools that narrowed focus starting in Phase One. This led to greater manageability of anecdotal notes and other qualitative data procured during informal observations during Phase One.

Qualitative data in Phase One (initial survey scores and initial classroom observations) were quantified into numeric scores toward the overall quantitative analysis. Students' collective scores of all assessments in each classroom were compared against the factors of learner-centeredness in correlation analysis to determine whether relationships exist between learner-centered classroom practices and qualities of thinking in arts classrooms. These quantitative analyses were assisted using Microsoft Excel and

transported into Statistical Package for the Social Sciences (SPSS), a computer software analysis program. Final reporting of results also utilized graphing models as informed by Webb's Depth of Knowledge classification system and framework (2005).

**Phase two: QUAN data analysis.**

Phase Two data was a quantitative analyses of the Myself-As-A-Learner (MALS) scale (Burden, 1998) using Microsoft Excel and transported into SPSS, the software analysis program mentioned above. Students' compiled scores by classroom were correlated with compiled scores for overall quality of thinking.

**Summary of Methods**

This chapter detailed the mixed model design of this study, intended to determine (1) the effect of classroom environments designed to be more (or less) learner-centered on students' overall quality of thinking, and (2) students' self-perceptions about their thinking and learning in these classrooms. The chapter also presented the procedures for obtaining the research sample, the rank-ordering of schools for the determined study, development and selection of instruments, and an overview of data analyses. Descriptive statistics and correlations were run for each instrument of the overall quality thinking matrix and classroom's total quality of thinking, main effects and interactions were examined for significant differences, and qualitative and quantitative results were presented. Chapter Four reports the findings of the study, and Chapter Five presents a summary and discussion of the findings.

## **Chapter 4—Presentation and Analysis of Data**

A sequential exploratory mixed model design was used to study the impact of learner-centered classroom cultures on middle school art students' abilities and dispositions to think in balanced, deep, and complex ways. Also explored were self-perceptions about students' learning in classrooms designed to be more learner-centered and those less so designed.

It was hypothesized that students' quality of thinking would be greater in classrooms that were designed to be more learner-centered (Research Question One). Quality thinking was defined as critical, creative, and practical thinking skills and dispositions together with depth and complexity. Learner-centered classrooms were defined as those more so designed to include the constructs of connection-making, inquiry, and self-directed practices. It was also hypothesized that students' self-perceptions about learning and thinking would increase in classrooms that were designed to be more learner-centered.

As a mixed model comparative study, students' compiled assessment scores for each class were compared against class rank, in order to determine if there was a difference in scores. This chapter presents the results of both the qualitative and quantitative data analyses, as collected in a sequential design. Interpretations of data are enhanced by mixing qualitative and quantitative techniques and using both inductive and



deductive approaches. Reporting the data analysis (QUAL + QUAN) in this manner, allows the researcher to take full advantage of a mixed model approach.

### Phase One Data Analysis

Phase One data analysis led to the rank ordering of schools as to their level of learner-centeredness. Classrooms were placed on a continuum rank order (1, 2, 3, 4, 5), with 5 being the highest level of learner-centeredness observed. This rank order was based on the compiled, quantitized scores of teacher surveys and subsequent in-class observations. Figure 5 shows the rank orders of classes as determined by the initial survey and follow-up observation.



Figure 5. Rank Orders of Classes

### Phase Two Data Analysis

Phase Two data consisted of the compiled scores of assessments comprising the Quality Thinking Matrix (Figure 6) as a determination of a classrooms' overall quality

thinking. Total matrix scores for each classroom were compared to the rank ordering of schools to determine possible and significant existing correlations. The hypothesis was that students' collective scores would increase with school rank for learner-centeredness, although alpha levels were not previously set. Results of the individual assessments comprising the matrix will be described in this chapter.

After all scores were compiled, mean scores for each classroom's total scores were scaled to provide equal weighting of each assessment's toward the total. Because this study involved rank ordering the schools, Pearson's correlation was used to measure the strength of linear associations between levels of learner-centeredness (rank order) and quality thinking scores (as compiled for all students in each classroom), to determine if differences existed.

Demographics were collected as to student age, ethnic background, and gender for all classes combined. The average age of the middle school students in this study was 12.73 years, with real ages ranging from 11 to 15. Seventy-eight percent of students identified themselves as Anglo American/Caucasian/White; 1.2% as Asian American/Pacific Islander; 7.1% as Hispanic, Latino, Mexican American; and 12.9% as Other. Forty-three point five percent of the total sample were male students and 56.5% were female students (n=85).

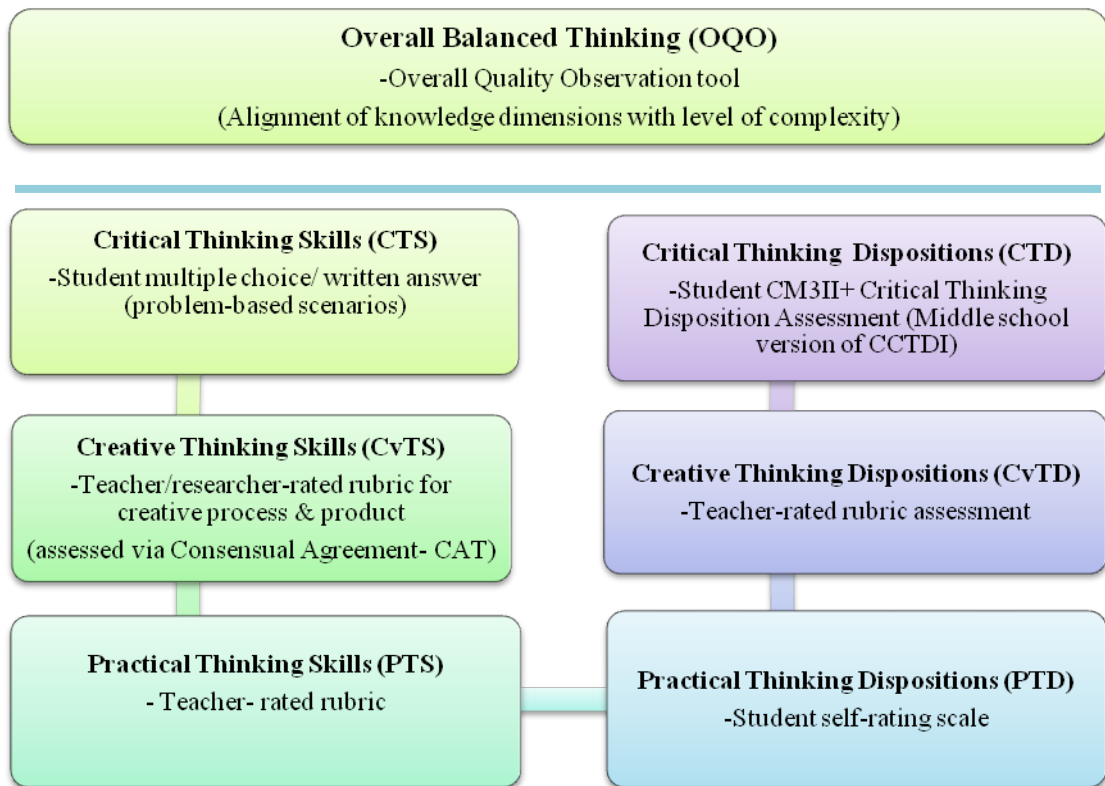


Figure 6. Quality Thinking Assessment Matrix

## Research Questions 1 and 2

The research questions guiding this study and the collection of data are:

1. Is there a difference in the quality of thinking skills of art and design students in classrooms that are designed to foster inquiry, connection-making, and self-directed learning and those that are less so?
2. How do students perceive their intelligence and understanding of a subject in these classrooms?

### Findings: Research question one.

To investigate the first research question and evaluate the hypothesis, Pearson's correlations were calculated to determine the strength of the relationship between

classroom rank (associated with determined levels of learner-centeredness) and total matrix scores (associated with quality thinking). An analysis using Pearson’s correlation coefficient indicated that a significant positive relationship existed between class rank and total matrix scores (.935,  $p=.020$ ). Therefore, a significant positive relationship also existed between the total matrix scores and learner-centeredness (scores which determined class rank) (.973,  $p=.005$ ) (Table 5; Figure 5).

Table 5

*Correlations of Total Scores with Rank and Rank Scores*

|              |                     | <b>LEARN</b> | <b>RANK</b> |
|--------------|---------------------|--------------|-------------|
| Total Scores | Pearson Correlation | .973(**)     | .935(*)     |
|              | Sig. (2-tailed)     | .005         | .020        |
|              | N                   | 5            | 5           |

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

Results for the correlation between total scores and class rank are also reported using a graphing model as informed by Webb’s Depth of Knowledge classification system and framework (2005). The graphing model displayed in Figure 7 was created in Microsoft Office Excel to show the alignment of total matrix scores with class rank. In this model, data occurs in order of rank (1, 2, 3, 4, 5) and is aligned with total scaled scores (scaled 0-3) for each assessment in the quality thinking matrix. Darker values (or darker areas of color) represent higher scores. Classrooms ranked at level four or five (five being the highest) show darker values, implying that classrooms that were ranked higher in learner-centeredness also scored higher in overall scores for quality thinking. The model indicates that higher rank-ordered classrooms align with increased student matrix scores.

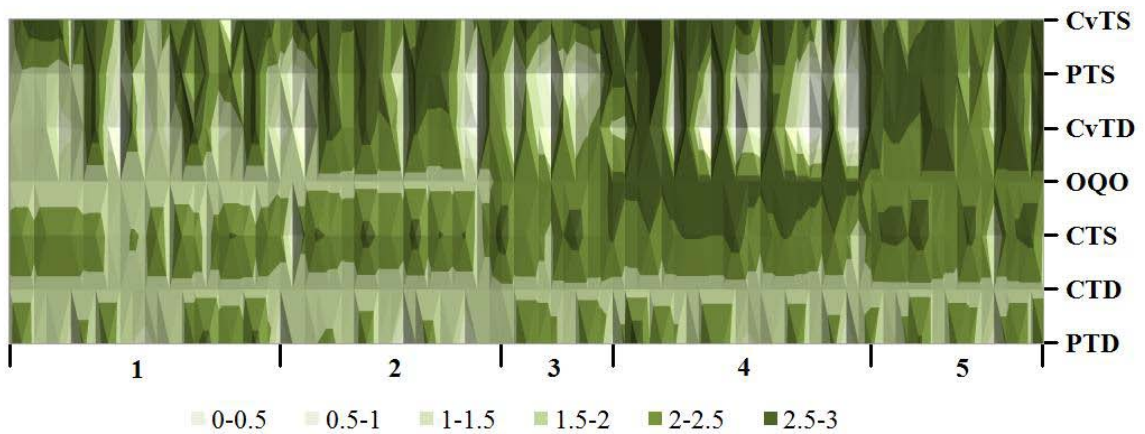


Figure 7. Alignment of Total Scores with Class Rank

Positive linear relationships existed between all of the individual assessment and the total matrix scores as presented in Table 6. Assessments exhibiting positive correlations with the total matrix scores include: Critical Thinking Skills (CTS), Practical Thinking Dispositions (PTD), Critical Thinking Dispositions (CTD), Overall Quality of Thinking (OQO), Creative Thinking Dispositions (CvTD), Practical Thinking Skills (PTS) and Creative Thinking Skills (CvTS). The correlations between individual assessments and total matrix scores, however, were not statistically significant as individual assessments.

Table 6

*Pearson Correlation Coefficients: Matrix Assessments with Total Scores*

|       |                     | CTS  | PTD  | CTD  | OQO  | CvTD | PTS  | CvTS |
|-------|---------------------|------|------|------|------|------|------|------|
| Total | Pearson Correlation | .619 | .265 | .380 | .676 | .738 | .644 | .407 |
|       | Sig. (2-tailed)     | .265 | .667 | .528 | .211 | .155 | .241 | .496 |
|       | N                   | 5    | 5    | 5    | 5    | 5    | 5    | 5    |

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

## Individual and Matched Pair Results

The Overall Quality Thinking (OQO) assessment indicated a significant positive correlation of .891 with class rank ( $p=.042$ ) (Table 7).

Table 7

*Correlation of Rank with OQO (Overall Quality Thinking Observation)*

|      |                     | RANK | OQO     |
|------|---------------------|------|---------|
| RANK | Pearson Correlation | 1    | .891(*) |
|      | Sig. (2-tailed)     |      | .042    |
|      | N                   | 5    | 5       |

\* Correlation is significant at the 0.05 level (2-tailed).

The significant positive associations between the OQO assessment, by compiled class scores and by rank, are also illustrated in Figure 8. Using Microsoft Office Excel, a three-dimensional area graph was created to analyze and report the degree of alignment between the assessed knowledge dimensions (factual/critical, conceptual/creative, and procedural/practical) and the depth of a student's thinking (complexity level/cognitive process dimension) as held to a standard (Webb, 2005). Assessment indicators for the Overall Quality Thinking (OQO) tool were described in Chapter Three.

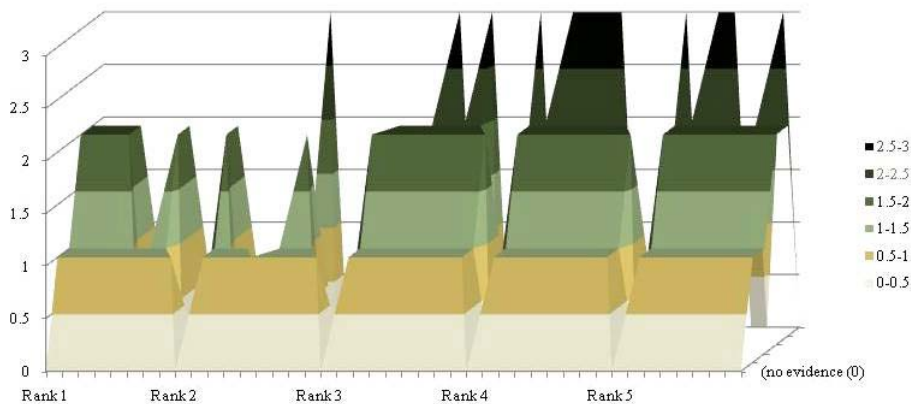


Figure 8. OQO Data (0-3 scale)

Significant positive relationships were indicated for the following matched pairs of matrix assessments (Table 8):

- Critical Thinking Skills (CTS) and Overall Quality Thinking (OQO) (.923,  $p=.025$ )
- Critical Thinking Dispositions (CTD) and Practical Thinking Dispositions (PTD) (.963,  $p=.008$ )
- Critical Thinking Skills (CTS) and Creative Thinking Skills (CvTS) (.94,  $p=.018$ )

Table 8

*Correlations Between Pairs of Matrix Assessments*

|      |                     | CTS     | PTD      | CTD      | OQO     | CvTD  | PTS   | CvTS    |
|------|---------------------|---------|----------|----------|---------|-------|-------|---------|
| CTS  | Pearson Correlation | 1       | .223     | .140     | .923(*) | .148  | -.093 | .940(*) |
|      | Sig. (2-tailed)     |         | .719     | .822     | .025    | .812  | .881  | .018    |
|      | N                   | 5       | 5        | 5        | 5       | 5     | 5     | 5       |
| PTD  | Pearson Correlation | .223    | 1        | .963(**) | .276    | .094  | -.285 | -.071   |
|      | Sig. (2-tailed)     | .719    |          | .008     | .653    | .881  | .642  | .910    |
|      | N                   | 5       | 5        | 5        | 5       | 5     | 5     | 5       |
| CTD  | Pearson Correlation | .140    | .963(**) | 1        | .176    | .335  | -.080 | -.189   |
|      | Sig. (2-tailed)     | .822    | .008     |          | .777    | .582  | .898  | .761    |
|      | N                   | 5       | 5        | 5        | 5       | 5     | 5     | 5       |
| OQO  | Pearson Correlation | .923(*) | .276     | .176     | 1       | .048  | .052  | .843    |
|      | Sig. (2-tailed)     | .025    | .653     | .777     |         | .939  | .933  | .073    |
|      | N                   | 5       | 5        | 5        | 5       | 5     | 5     | 5       |
| CvTD | Pearson Correlation | .148    | .094     | .335     | .048    | 1     | .690  | -.052   |
|      | Sig. (2-tailed)     | .812    | .881     | .582     | .939    |       | .198  | .933    |
|      | N                   | 5       | 5        | 5        | 5       | 5     | 5     | 5       |
| PTS  | Pearson Correlation | -.093   | -.285    | -.080    | .052    | .690  | 1     | -.172   |
|      | Sig. (2-tailed)     | .881    | .642     | .898     | .933    | .198  |       | .782    |
|      | N                   | 5       | 5        | 5        | 5       | 5     | 5     | 5       |
| CvTS | Pearson Correlation | .940(*) | -.071    | -.189    | .843    | -.052 | -.172 | 1       |
|      | Sig. (2-tailed)     | .018    | .910     | .761     | .073    | .933  | .782  |         |
|      | N                   | 5       | 5        | 5        | 5       | 5     | 5     | 5       |

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

## Student Level Correlations

At the student level (n=85) but not by class rank (n=5), significant negative correlations were found to exist between student age and two of the assessments in the Quality Thinking Matrix (Table 9). The total scaled scores of the Critical Thinking Dispositions (CTD) assessment had a significant negative correlation of  $-.408$  ( $p=.000$ ) as compared to student age. Total scaled scores of the Practical Thinking Skills assessment (PTS) had a significant negative correlation of  $-.248$  ( $p=.022$ ). In this study, older students (by 1-2 years) included students in schools ranked 3 and 4 for learner-centeredness (5 being the highest), meaning that older students in classrooms designed to be more learner-centered, were ranked lower for their analytical thinking dispositions and their practical thinking skills.

Table 9

### *Correlation of Student Age with Matrix Assessments*

|             |                     | CTS<br>Scaled | PTD<br>Scaled | CTD<br>Scaled | OQO<br>Scaled | CvTD<br>Scaled | PTS<br>Scaled | CvTS<br>Scaled |
|-------------|---------------------|---------------|---------------|---------------|---------------|----------------|---------------|----------------|
| Student Age | Pearson Correlation | .069          | -.086         | -.408(**)     | .297(**)      | -.153          | -.248(*)      | .105           |
|             | Sig. (2-tailed)     | .532          | .431          | .000          | .006          | .163           | .022          | .338           |
|             | N                   | 85            | 85            | 85            | 85            | 85             | 85            | 85             |

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

Lastly, significant positive correlations were reported for six of the seven matrix assessments when compared with the total scaled scores of all assessments (Table 10). Students' total scaled scores (not by class), when correlated with total scaled scores overall, were significantly positive for the CTS, PTD, OQO, CvTD, PTS, and CvTS (at .01 and .05 levels).



Table 10

*Correlation of Matrix Assessments with Total Scaled Score (student level)*

|              |                     | CTS<br>Scaled | PTD<br>Scaled | CTD<br>Scaled | OQO<br>Scaled | CvTD<br>Scaled | PTS<br>Scaled | CvTS<br>Scaled |
|--------------|---------------------|---------------|---------------|---------------|---------------|----------------|---------------|----------------|
| Total Scaled | Pearson Correlation | .463(**)      | .563(**)      | .148          | .297(**)      | .864(**)       | .848(**)      | .695(**)       |
|              | Sig. (2-tailed)     | .000          | .000          | .176          | .006          | .000           | .000          | .000           |
|              | N                   | 85            | 85            | 85            | 85            | 85             | 85            | 85             |

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

**Research Question One: Reporting QUAL Data**

An open coding method was used to analyze qualitative data informing Research Question One. Data included researcher’s anecdotal notes from observations and informal interviews with teachers and students. This raw data was compiled and organized using Microsoft Office Excel. The three phases of recoded data and data reduction processes resulting in the final conceptual categories are listed below:

1. Early patterns were revealed consisting of: (1) Pedagogy, (2) Empowerment, (3) Caring, (4) Culture of Thinking, (5) Constructivism, and (6) Balance.
2. These were recoded and reduced to the categories of: (1) Culture of respect and caring, (2) Balanced environment, (3) Culture of learning and thinking, and (4) Belief Systems
3. Lastly, the themes were combined to the overarching concepts of: (1) Dynamic classroom (combining Culture of respect and caring and Balanced environment), (2) Culture of learning and thinking, and (3) Belief systems (self, teacher, school).

Recoding of the data consisted of recompiling all raw data (field notes, observation notes from the researcher’s observation rubrics, and informal interview notes) which had been compiled in Microsoft Office Excel and physically resorting them. Viewing the data again, and in a holistic way, allowed for patterns that had emerged in

the first coding to be combined, reconsidered, and modified toward more concise and inclusive categories. In the second recoding of the QUAL data, the number of observed occurrences (not counting negative observations) for each category was noted and tallied as follows:

- Culture of Respect and Caring: 42 notations
- Balanced Environment: 33 notations
- Culture of Thinking: 48 notations
- Belief Systems (student and teacher): 41 notations

Data that might identify schools, classrooms, or teachers were not included in the count.

Figure 9 illustrates the supporting research references, added to ground the data.

|  |
|--|
| <p><b>Culture of Respect and Caring</b></p> <ul style="list-style-type: none"> <li>• Culture of caring: supporting students’ need for a personal connection with the teacher (Darling-Hammond, 1997; Noddings, 1992)</li> <li>• Cultures of learning as a democratic setting: everyone holds responsibility to contribute, share, and support others (Darling-Hammond, 1997; Ritchhart, 2002; Dewey, 1897)</li> <li>• Supporting a culture of thinking that allows time for self-direction (organizing), self-assessment, self-correcting, reflection and other metacognitive processes (Pintrich, 1999; Ritchhart, 2005)</li> </ul>   |
| <p><b>Balanced Environment (Creative with Critical + Responsibility)</b></p> <ul style="list-style-type: none"> <li>• Environments that encourage risk-taking, innovation, and engaged hands-on learning (Eisner, 2002), balanced with responsibility (Gardner, 2007)</li> <li>• Training for synthetic, 21<sup>st</sup> century thinking (Gardner, 2007)</li> </ul>   |
| <p><b>Culture of Learning and Thinking (inquiry, connection-making, meaning)</b></p> <ul style="list-style-type: none"> <li>• Respect for all students; a safe environment for inquiry and discussion; encourages expression of ideas/opinions (Dewey 1897; Noddings, 1992; Ritchhart, 2005).</li> <li>• Meaning-making; connection-making/personally meaningful (Eisner, 2002; Sternberg &amp; Lubart, 1999)</li> <li>• Engaged hands-on learning, enhanced by personal meaning (Noddings, 1992); knowledge that personal meaning directs motivation which directs deeper learning</li> <li>• Knowledge is demonstrated (because it is deep, connected; “conceptual agility” (Gardner, 2007); “visible thinking” (Ritchhart, 2002)</li> </ul> |
| <p><b>Belief Systems</b></p> <ul style="list-style-type: none"> <li>• Knowledge of effect of self-perceptions/beliefs about one’s learning (Pintrich, 1999; Resnick, 1999) on learning</li> <li>• Evidence of teacher beliefs that students are individuals and whole persons: body, mind, spirit</li> <li>• Pedagogical (guide/facilitator) to aid in construction of knowledge/intelligence as flexible, ongoing, expanding</li> <li>• Epistemological (Belief that ALL students can (1) achieve at a high level (ALL CAN LEARN), (2) should be held to high standards/capacities for learning</li> </ul>  |

Figure 9. Recoded Data with Research Base

In the third recoding of data, a theory began to emerge regarding the overarching concepts observed in more learner-centered classrooms. This theory will be explained in Chapter Five (see Figure 12). The overarching concepts regarding learning in these classrooms were articulated by three descriptors: (1) exploratory, (2) balanced, and (3) deep. Key evidence statements from the data were compiled and reduced for inclusion in this report (Figure 10).

| Conceptual Theme                        | Description of Sub-Theme(OUTCOMES)   | Evidence Statements  |
|---|--|--|
| <b>Dynamic Classroom</b>                | <ul style="list-style-type: none"> <li>Empowering classroom culture (respect &amp; shared responsibility)</li> <li>Personal connection and communication (teacher cares, listens, imparts, guides, connects--not sage on a stage)</li> <li>Shared responsibility and support</li> <li>Curriculum is flexible and open/shaped by reflection (democratic)</li> <li>Safe environment for inquiry and questioning is encouraged</li> <li>Learning as balanced (PROCESS + PRODUCT)</li> </ul> | <p>“Teacher trusts students, gives autonomy, and expects them to incorporate personal meaning, diligence, and craftsmanship”</p> <p>“High degree of student self-direction (students are entrusted, plan, utilize design thinking, self-assess)”</p> <p>“Teacher connects with students using humor, direct comments, 1/1 attention”</p> <p>“Teacher asks students what steps <i>they</i> need to take to improve their work; spends time in individual critique with students while in process”</p> <p>“Apparent that teacher really <i>knows</i> students; able to be honest with them in evaluations and in person without offending”</p> <p>“Equal emphasis on process and product”</p> <p>“Students engage in a design-thinking process (exploring, planning, refining, enacting a plan within design parameters)</p> <p>“Classroom possesses a ‘magic balance’ of creative, real-world practicality and critical thinking (reflective, connective thinking)”</p> <p>“Teacher models curiosity”</p> <p>Vs.</p> <p>“Students seem disconnected from each other”</p> <p>“Teacher is non-emotional, non-engaged; distant from students”</p> <p>“Creative risk-taking/creative leaps are low in this class”</p> |
| <b>Culture of Learning and Thinking</b> | <ul style="list-style-type: none"> <li>Culture that encourages risk-taking, questioning, investigation</li> <li>Meaning-making</li> <li>Nurtures synthetic, 21st century thinking (critical &amp; creative + responsibility)</li> <li>Metacognitive (time for reflection; self-assessment; self-organizing; self-directing)</li> <li>Purposeful learning and thinking culture</li> <li>Understanding is deep, connected, shows “conceptual</li> </ul>                                    | <p>“Deep level of engagement”</p> <p>“Encourages innovation, not sameness: Note on whiteboard says ‘Is it common, or is it unique?’”</p> <p>Teacher comment: “Critical and creative thinking is part of each day...It is highly motivational for students and prepares them for life in the 21st century.”</p> <p>“Creativity and complexity of projects shows their understanding”</p> <p>“Self-motivation is high; high degree of engagement in this class”</p> <p>“This is a very active, happy, self-directed classroom”</p>   |

| Conceptual Theme      | Description of Sub-Theme(OUTCOMES)  | Evidence Statements   |
|-----------------------|---|---|
|                       | agility” <ul style="list-style-type: none"> <li>• Knowledge is demonstrated/visible</li> <li>• Class organized for thinking vs. survival</li> </ul>   | “Treats the classroom and students as apprentices”<br>“Bases lesson planning on reflective practice”<br>“Students are given <i>time</i> in class to reflect and prepare their presentations”<br>“Presentations/critiques made students’ thinking visible as their talked about their displayed projects”<br><br>Vs.<br>“Personalization and connection-making are not priorities (largely teacher-driven in project decision and day-to-day activity)”<br>“Questioning is not valued, no time given to inquiry”<br>“Many of the students’ projects reflect the teacher’s input/ideas”   |
| <b>Belief Systems</b> | <ul style="list-style-type: none"> <li>• Values the individual (strengths, preferences, personal) as a whole person: body, mind, spirit</li> <li>• Epistemological belief that all can learn/have capacity to achieve/are held to high standard</li> <li>• Knowledge of affect of self-perceptions/beliefs (Pintrich, 1999; Resnick, 1999) on learning</li> <li>• Pedagogical belief: Teacher as guide/facilitator, to aid in construction of knowledge/intelligence as flexible, ongoing, expanding</li> </ul> | “Students are allowed autonomy and independence; students are held to a standard in their behavior/dispositions”<br>“Teacher tries to strike the balance between keeping the learning on track and valuing students’ personal desires, creative depth, and opinions”<br>“Talks to students—a lot. Engages!”<br>“Students are encouraged to synthesize ideas, add personal meaning, and abstract parts into new wholes”<br>“Treats the classroom and students as apprentices”<br>“Teacher is enthusiastic about their own desire to learn more...to try out new ideas”<br><br>Vs.<br>“More emphasis on final product than on process”<br>“Project has lower expectations for conceptual meaning-making; students were not encouraged to make connections”<br>“Classroom not ‘organized for effort’ in that students do not set goals or have low sense of purpose in the projects”<br>“Teacher doesn’t feel there is time to discuss or question in class”<br>“Students are not able to wrestle with big ideas at this age”<br>“Projects are largely teacher-driven; creative risk taking is not valued” |

Figure 10. QUAL Data: Themes and Evidence

### Across-School Themes

As an alternative way of analyzing the qualitative data, the researcher explored themes emerging from the data across all classrooms (Figure 10). Using an open coding method, the researcher’s anecdotal notes, rubric notations, and observational notes were

recoded toward a more deductive view, revealing central themes that were represented by all classrooms, to a greater or lesser degree. The intent was to reduce common themes across data sites to fewer categories, such as “low,” “medium,” and “high.” It became apparent to the researcher, however, that particular themes did not fit the projected pattern and that the five ranked schools possessed unique characteristics that could not be reduced to low, medium, and high categories; thus, the original rank orders were maintained.

For instance, one might expect that a school ranking higher in learner-centeredness would also have a higher amount of “contact time,” or amount of time that the teacher has with students in the classroom, but this was not the case. The class ranking highest in learner-centeredness had the lowest amount of time in the classroom with students (half the amount of classes ranking at the low/medium level). Other surprising outcomes were found in the following: (1) use of technology, (2) classroom management, (3) and the use of inquiry-based practices found in the medium rank-ordered classroom. These running themes produced by observational data, if quantified using the 4-point scale throughout this study (0-1-2-3), would produce similar results for a classroom’s level of learner-centeredness, except for classrooms assigned rank orders of “1” and “2” (5 being the highest).

Another key finding was that in higher rank-ordered classrooms, greater administrative support and school-wide collaborative vision was shared. School cultures that possessed a shared vision toward the importance of building thinking skills, inquiry-based practices, and/or providing an inquiry-based culture of thinking (Ritchhart, 2002)

were apparent in classrooms with higher learner-centered scores. In these higher thinking cultures (medium-level classrooms included), the art teachers modeled a spirit of collaboration and excitement for learning—not operating as “lone rangers,” but modeling learning as a school-wide and connected adventure (Owens & Valesky, 2007, p. 280). The researcher’s observations of this phenomenon, are supported in examples of anecdotal findings such as: “Teacher...talks about personal discussions with the principal/high principal support,” “high degree of principal support,” “whole school emphasizes ‘life skills’ (21<sup>st</sup> century dispositions and problem solving),” “principal expressed respect and appreciation for art teacher’s consistent desire to apply new learning to their practice,” and “[thinking] is a part of teacher instruction and learning for students in every classroom in every subject area.”

| <i>Themes</i>                                | <i>Classes by Rank</i> |              |          |            |          |
|--|------------------------|--------------|----------|------------|----------|
|  | 1-Low rank             | 2-Low/med    | 3-Med    | 4-Med/high | 5-High   |
| Contact Time                                 | High                   | Low          | High     | High       | Low      |
| Degree of student autonomy/choice            | Moderate               | Low/moderate | Moderate | High       | High     |
| Critical thinking                            | Low                    | Low          | Moderate | Moderate   | High     |
| Student self-organizing/monitoring/assessing | Low                    | Low          | Low      | Moderate   | High     |
| Product over process                         | Product                | Product      | Equal    | Equal      | Equal    |
| Questioning/Inquiry                          | Low                    | Low          | High     | Moderate   | High     |
| Meaning-making and Connection-making         | Low                    | Low          | Low      | Moderate   | High     |
| Use of technology                            | High                   | Low          | High     | Low        | Low      |
| Creativity Emphasized                        | Low                    | Low          | Moderate | High       | High     |
| Admin/School involvement                     | Low                    | Low          | Moderate | High       | High     |
| Classroom Management                         | High                   | Low          | High     | High       | Moderate |
| Teacher engagement                           | Low                    | Low/med      | Med/high | High       | High     |
| Teacher planning/organizing for effort       | Moderate               | Low          | Low      | High       | High     |

*Figure 11.* Themes Observed Across All Schools

### **Findings: Research question two.**

Research Question Two addressed students' self-perceptions regarding their learning and thinking in the classrooms of this study: those designed to be more learner-centered, and those designed to be less so. To understand possible relationships between students' self-perception about learning and their performance in these classrooms, correlation analysis was conducted using Pearson's correlation coefficient.

Pearson's correlations indicated a significant positive relationship between the Myself-As-A-Learner scale (MALS, Burden, 1998) and classroom scores for learner-centeredness (.933,  $p=.020$ ). A significant positive relationship also existed between the MALS and total scaled scores (.953,  $p=.012$ ) (Table 11).

Table 11

*Correlations: MALS with Rank, Learner-Centered Scores and Totals*

|      |                     | RANK | LEARN   | Total   |
|------|---------------------|------|---------|---------|
| MALS | Pearson Correlation | .833 | .933(*) | .953(*) |
|      | Sig. (2-tailed)     | .080 | .020    | .012    |
|      | N                   | 5    | 5       | 5       |

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

### **Limitations of the Study**

The goal of this exploratory, mixed model study was to understand the difference that learner-centered environments had on students' quality of thinking, as they were so designed to a lesser or greater degree.

First, the classrooms selected for inclusion in this study represented comparative cases of a small sample; therefore, there are limitations with regard to the transferability of results from this study (Lincoln & Guba, 1985).

Second, the study was limited by its purposive sample within one school district; this decreased the transferability of the findings to other settings. The research findings derived in this specific context of visual art in a limited number of schools (n=5), cannot be assumed to apply in other settings or under other conditions. It would be inappropriate in this study design to claim traditional statistical conclusions; rather, strength is drawn in this study from the contrast between the classrooms and schools, combined with the number of students as n=85. The issue of statistical power is irrelevant in this study.

Third, researcher bias inevitably occurs in the gathering of data, analysis of information, and development of conclusions. The researcher's personal biases influenced the data collection and analysis as dictated by the research question and the researcher's prior knowledge and experience. These biases were reflected in various choices the researcher made about which data to include and how to interpret it. Inevitable also, were teachers' biases based on their own experiences and knowledge, which influenced the data itself.

### **Summary of Findings**

This study explored the affects of classrooms designed for learner-centeredness on students' quality of thinking. It also examined the self-perceptions of students with regard to their learning abilities and understanding in these visual art classrooms. Descriptions of the findings were detailed in this chapter. Summarized, these findings are organized by Research Questions 1 and 2 and are as follows:

#### **Summary of findings: Research question one.**

1. A significant positive relationship existed between class rank and total matrix scores (.935,  $p=.020$ ). Therefore, a significant positive relationship



also existed between the total matrix scores and learner-centeredness (scores which determined class rank) (.973,  $p=.005$ ).

2. Total matrix scores exhibited positive correlations with individual Quality Thinking Matrix assessments, including: Critical Thinking Skills (CTS), Practical Thinking Dispositions (PTD), Critical Thinking Dispositions (CTD), Overall Quality of Thinking (OQO), Creative Thinking Dispositions (CvTD), Practical Thinking Skills (PTS) and Creative Thinking Skills (CvTS). The correlations between individual assessments and total matrix scores, however, were not statistically significant
3. The Overall Quality Thinking (OQO) assessment showed a significant positive correlation of .891 with class rank ( $p=.042$ )
4. Significant positive relationships were indicated for the following matched pairs of matrix assessments: Critical Thinking Skills (CTS) and Overall Quality Thinking (OQO); Critical Thinking Dispositions (CTD) and Practical Thinking Dispositions (PTD); and Creative Thinking Skills (CvTS) and Critical Thinking Skills (CTS)
5. At the student level, significant negative correlations were found to exist between student age and Critical Thinking Dispositions (CTD) (-.408,  $p=.000$ ) and Practical Thinking Skills assessment (PTS) (-.248,  $p=.022$ ). Older students were from classrooms that rank ordered as #3 and #4 (#5 being the highest)
6. Also at the student level, significant positive correlations existed for six of the seven matrix assessments when compared with the total scaled scores of all assessments: the CTS, PTD, OQO, CvTD, PTS, and CvTS (at .01 and .05 levels).
7. Qualitative data analyses indicated that classrooms which employed learner-centered practices to a greater degree were more (1) exploratory, (2) balanced, and (3) deep, as driven by quality thinking systems that were (1) Dynamic (cultures of respect and caring in a balanced environment), (2) Focused on learning and thinking, and (3) Possessing belief systems that valued learning (at the personal, teacher, and school levels).
8. Qualitative data analysis also suggested that teacher contact time, use of technology, and classroom management (as viewed in the traditional sense) was negatively associated with a classroom's level of learner-centeredness. School-wide visions for thinking and learning as well as a teacher's commitment to collaboration was positively related to a classroom's designated level of learner-centeredness (rank).

**Summary of findings: Research question two.**

1. Student self-perceptions about their learning and thinking showed significant positive correlations with class rank (learner-centeredness) (.953,  $p=.012$ ).

While the results cannot be generalized to other populations and geographical areas, statistically significant results of this small sample of classrooms indicated that more learner-centered environments had a positive effect on students' overall quality of thinking as demonstrated in a balanced way. Results also indicated that more learner-centered classrooms also had a positive effect on students' self-beliefs regarding their intelligence and understanding in the context of visual art.

## **Chapter 5—Discussion**

It is imperative that education systems train 21<sup>st</sup> century students for critical, creative, and practical thinking (Bransford et al., 2000; Gardner, 2007; Pink, 2005; Silva, 2008; Sternberg, 2008), yet little research has been published showing the impact of art and design training on these qualities of thinking. Even fewer studies exist regarding the effect of teaching and learning environments in art classrooms on students' balanced thinking toward an indication of overall quality of thinking. Additionally, very little has been reported as to how students' self-beliefs about their intelligence and understanding in a subject impact their overall thinking quality, including the arts. Because so little investigation has been made into these areas of research, this study sought to determine if relationships existed between learner-centered visual arts classrooms, quality thinking, and students' self-beliefs about their learning and understanding.

The purpose of this study was to explore the impact of learner-centered classroom environments—those so designed to a greater or lesser degree—on middle school visual art students' quality of thinking. Quality thinking or the ability to think in balanced, complex ways (critical, creative, and practical), leading to depth of knowledge, provided a framework for this research study (Sternberg, 2003b; Sternberg & Grigorenko, 2004; Webb, 2005). Learner-centered art classrooms were those which employed inquiry, connection-making, and self-directed learning practices. Also explored were students' self-perceptions regarding their intelligence and understanding in these classrooms.

The research questions guiding the exploration of these topics were:

1. Is there a difference in the quality of thinking skills of art and design students in classrooms that are designed to foster inquiry, connection-making, and self-directed learning and those that are less so?
2. How do students perceive their intelligence and understanding of a subject in these classrooms?

This chapter describes the findings from the study regarding Research Question One and Research Question Two. In addition, conclusions and recommendations for future practice and research based on the study will be presented.

### **Discussion of Findings: Research Question One**

In this mixed model comparative study, a purposive sample of five classrooms was rank ordered by their level of learner-centeredness and students were assessed in seven areas for an overall measure of quality of thinking: critical, creative, and practical thinking skills; critical, creative, and practical dispositions, and overall balanced thinking. The results showed significant, positive correlations between class rank (based on the scores for learner-centeredness) and total assessment scores (.935,  $p=.020$ ). The level of learner-centeredness, or rank, of a classroom environment had a direct correlation with overall student scores in the measurements toward quality thinking. The higher the rank of learner-centeredness, student scores increased.

The quantitative data analysis showed that matrix assessments were not statistically significant individually, but when factored into an integrated whole, assessments were statistically significant. The assessment of quality thinking was

strongest when approached from a balance of critical, creative, practical thinking and dispositions *with depth*—as an integrated whole. These results indicate overall validation of the assessment matrix used as a comprehensive unit. It also indicates that the individual assessments toward quality thinking did measure what they intended to measure, adding to their separate validity.

These findings support former research that students who are taught and assessed in balanced ways, outperform students who are taught in ways that only emphasize memory or analytical thinking alone (Sternberg, 2008; Sternberg et al., 1998a, 1998b, 2000). The results provide support for the importance of improved learner-centered practices in the art classroom, as well as a needed emphasis in both education and art education on improving students' overall capacities to learn through a balance of cognitive, emotional, and social skills and dispositions (Claxton, 2007).

Significant positive relationships existed between certain pairs of matrix assessments and could be understood within the theory of successful or balanced intelligence (Sternberg, 1999a, 2003), which views thinking domains as overlapping and synergistic; the critical, creative, and practical work together toward quality thinking (Bailin et al., 1999; Tishman et al., 1997; Sternberg, 1999a). Critical Thinking Skills (CTS) were significantly correlated with both Overall Quality of Thinking (OQO) and Creative Thinking Skills (CvTS) (.94 and .923, respectively, at the .05 level), which is understandable as critical and creative thinking work in tandem (Bailin et al., 1993; Paul & Elder, 2006), and both inform quality thinking. Practical Thinking Dispositions (PTD) and Critical Thinking Dispositions (CTD) also showed significant positive correlations

(.963,  $p=.008$ ). This finding is sensible in that students' dispositional strengths (in this case, critical and practical dispositions) would support each other, as effective components work together with cognitive and motivational domains toward overall quality thinking (Bailin et al., 1993).

Lastly, statistical analysis showed a significant positive correlation of the Overall Quality Thinking (OQO) assessment with class rank (.891,  $p=.042$ ). To the researcher, this is not surprising, as evidence of students' ability to think with complexity as well as their ability to engage the thinking dispositions they possess, would naturally increase with age. It would also make sense that schools of higher rank for learner-centeredness also provide a culture of thinking (Ritchhart, 2002) for students and provide increased opportunities for them to engage deeply and make their thinking visible through their performances of understanding.

### **Discussion of Findings: Qualitative Data**

Knowledge gained during the qualitative, open coding analysis of data regarding learner-centered classrooms in this study (see Figure 9) led to an emerging theory including overarching concepts and three descriptive categories of quality thinking systems that existed in these classrooms. Findings led to the recognition that classrooms ranking higher in learner-centeredness were also those supported by observed, school-wide cultures of thinking (Ritchhart, 2002).

The overarching concepts of (1) Dynamic classrooms, (2) Cultures of thinking and learning, and (3) Belief systems (self, teacher, school), led to three descriptive categories of these "Quality Thinking Systems." The underlying three categories

described the type of learning and thinking in classrooms designed to be more learner-centered as: (1) exploratory, (2) balanced, and (3) deep.

These three outcomes showed what exploratory thinking and learning might “look like” (connectivist, inquiry-driven, constructivist, and self-directed); what balanced thinking and learning might “look like” (a balance of analytical, creative, and practical, creative yet responsible, and process being equal to product); what deep thinking and learning might “look like” (conceptually flexible, synthetic, meaningful, and visible).

The emergent theory operated on the hypothesis that quality thinking systems, as observed in more learner-centered classrooms, were driven by:

- Dynamic classroom environments that were active, constructivist, self-directed and fostered respect and community;
- Cultures of thinking and learning that supported inquiry, risk-taking, connection-making, and deep understanding;
- Belief systems that valued students as whole persons (body, mind, spirit) and supported all students’ capacity for learning and achievement.

In turn, the effects of the overarching themes describing learner-centered classrooms were further explained by the types of learning produced. Under the Quality Thinking Systems theory, quality learning is explained as being (1) exploratory, (2) balanced, and (3) deep. The working model illustrated in Figure 12 is composed of the major elements described as being possible sources of influence of growth in students’ quality thinking while in middle school visual art programs.

Qualitative data analysis also suggested that teacher contact time, use of technology, and classroom management (as viewed in the traditional sense) was negatively associated with a classroom’s level of learner-centeredness. School-wide

visions for thinking and learning as well as a teacher’s commitment to collaboration were positively related to a classroom’s designated level of learner-centeredness (rank).

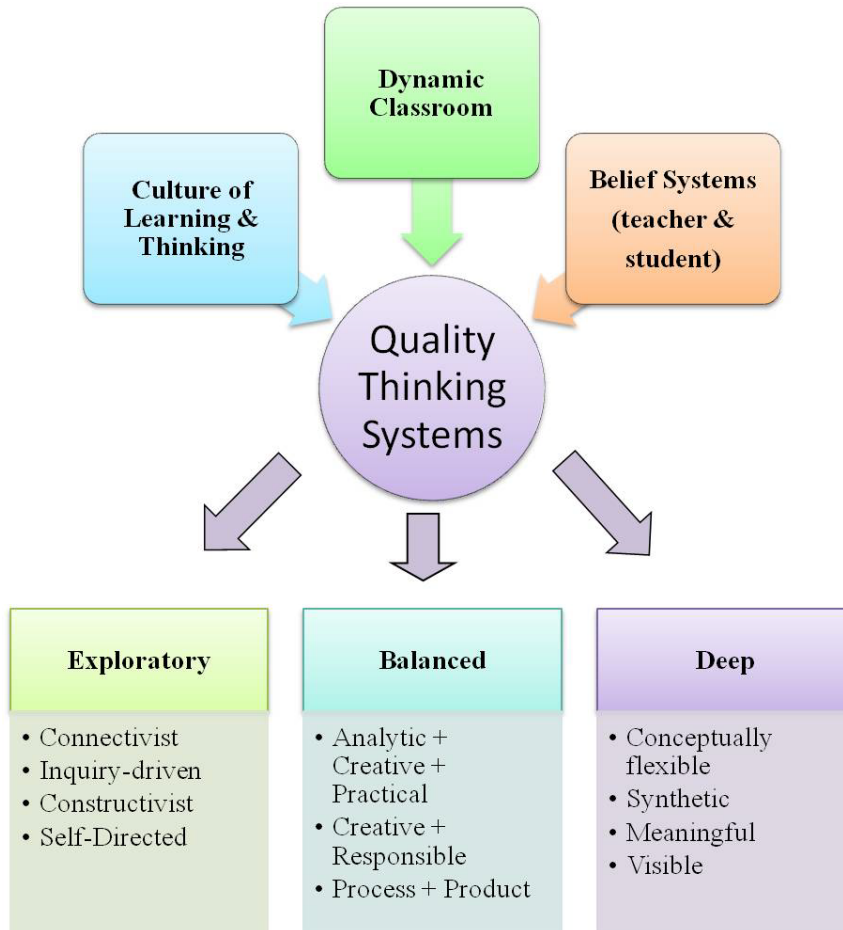


Figure 12. Quality Thinking Systems Model

**The quality thinking systems theory.**

Reviews of the literature regarding the role of systems thinking and 21<sup>st</sup> century school reform (reported earlier in this paper) together with results from the current study, have come full circle. As reported in this study, higher rank-ordered schools were associated with teachers’ more positive expressions of commitment to life-long learning and to their teaching practice as well as to supportive school-wide cultures of thinking.



This research, and the emerging theory, lends insight into the ways schools are dynamic systems that work to create more dynamic teachers and classrooms, leading to increased student commitment levels and increased capacity to learn (Claxton, 2007). These are the types of learning systems that this study suggests, may “tap people’s commitment and capacity to learn at all levels in an organization” (Senge, 1990, p. 4).

The process of qualitative data collection and analysis that led to the emergent theory of quality thinking systems (Figure 12), is supported by systems thinking approaches for understanding learning organizations (Argyris & Schön, 1996; Fullan, 2001; Owens & Valesky, 2007; Senge, 1990). In particular, the theory emerging from this study explores the role of epistemological, pedagogical, and personal beliefs toward building cultures of thinking and learning.

Former theories lend insight into the ways teachers’ mental models (Senge, 1990, p. 174) shape their pedagogy, as well as the ways their mental models are affected by the systems in which they teach. Argyris and Schön’s research (1996) is a reminder into the ways in which teachers’ theories-in-use (teachers’ assumptions and deeply held beliefs) guide their behavior and pedagogy.

The belief systems perpetuated by district goals, individual schools, and the professional learning communities within them, affect student learning. Administrative leaders hold a powerful role in this regard. Their views toward the development of teachers as leaders and their own belief systems—in this case about the value of the arts and the role of arts teachers—also affect the belief systems of teachers and students.

The classrooms in this study that were ranked higher for learner-centeredness were noted for having strong working relationships with their administrative leaders and with other teachers in the building. Lower rank-ordered classes had notably less contact or input from administration and were reportedly more disconnected from their professional learning communities. In classrooms designed to be more learner-centered, the art teachers were considered (by administration, other teachers, and to themselves) as having a vital and core role in the education of students and in the professional learning communities of which they were a part. This is a finding in this research that deserves more investigation. This study and the emerging theory may provide insight into how dynamic learning systems and the active belief systems they hold, may better nurture the kind of flexible, adaptive thinkers—at all levels of the learning organization—needed in a complex world (Owens & Valesky, 2007; Senge, 1990).

#### **Data-informed tool development.**

As a mixed model design, qualitative data collection informed and led to the refining of the research-developed assessments for this study. Reviews of the literature surrounding quality thinking and the assessment of quality thinking, served as the primary informant for the content and design of the observation tools and assessments developed for this study; however, anecdotal notes and the researcher's observation provided additional enlightenment.

During data collection early in Phase One, the noted impact of students' learning and thinking culture on their levels of motivation, their focused attention to their work, and the use of naming and thinking words (both students' and teachers'), led the

researcher to include this construct as a separate item in the final development of the Overall Quality Observation (OQO) assessment tool. It became more apparent that students' quality of thinking could not be assessed apart from the learning culture (Claxton, 2002; Ritchhart, 2002). The researcher considered it important to take into account the culture in which a student learns, as a construct influencing students' overall quality thinking. Students' balanced thinking abilities—and their abilities as a community of learners—were dependent, in part, on the environment in which they used their thinking.

The decision to include this construct was grounded in the literature surrounding cultures of thinking as evidence that students' abilities to think with depth and complexity (to reason, to synthesize, to deal with ambiguity and to abstract), are highly influenced by the learning culture (Ritchhart & Palmer, 2003). This information lent supporting evidence for the inclusion of “culture” as an assessment item on the OQO tool.

### **Discussion of Findings: Negative Correlations**

Significant negative correlations were shown between student age with the CTD (-.408,  $p=.000$ ), and age with the PTS (-.248,  $p=.022$ ). Students in this study ranged from age 11 to 15. Although perhaps confounding evidence, older students in this study (by 1-2 years) were from classrooms ranked 3 and 4 for learner-centeredness (5 being the highest), meaning that older students in classrooms designed to be more learner-centered, were ranked lower for their analytical thinking dispositions and their practical thinking skills. It might be expected that older students in classrooms designed to be more learner-

centered, might also possess stronger dispositions for critical thinking and for using tacit thinking skills.

Critical thinking dispositions, as scored by the CM3 II+ assessment (Facione et al., 2000), measured the degree to which students are cognitively engaged and mentally motivated toward thinking that involves reasoning. More specifically, it measured four dispositional aspects of critical thinking: desire to learn, mental focus, open-mindedness, and creative problem solving. While this assessment has a proven record of reliability, external and predictive validity, and is the recommended assessment level for middle school students, this was the only assessment without domain specificity to the arts.

The negative correlation may also be explained in that as students move closer toward high school age, they perhaps become more rigid in their critical and practical thinking. Perhaps they question less and lose some of their desire to learn and problem solve (Robinson, 2001). Lipman (2003) proposed that students' desire to learn in school often decreases with age, especially within educational systems that promote boredom instead of exploration, autonomy, active engagement in inquiry, and thinking for oneself. This description, however, would not seem to match the schools in this study ranking higher in learner-centeredness.

Statistically negative correlation between student age and the Practical Thinking Skills (PTS) assessment may be attributed to similar conjectures, in that the closer students get to high school age, the less ready, willing, and able they may be (Claxton, 2002) to engage their practical thinking skills. Tacit dispositions launch practical thinking

skills, thus they are related to knowledge about self (intrapersonal), tasks (organization, presentation, use of tools/materials, professionalism, etc.), and others (interpersonal).

The PTS was a teacher-rated scale, and negative correlations may also be explained in that (1) teachers tend to hold higher expectations for older students in terms of practical thinking (knowledge about self, others, and procedures/use of tools, etc.) and hold them to a higher standard, or that, (2) instrument items and their specificity to practical skills that art teachers would observe in the context of the art classroom, may need revision. One teacher did comment to the researcher that a few of the skills specified were less used in the classroom, such as “Makes wise choices in life and relationships” or “Resists pressure to engage in unsafe or unethical activities.” This suggests that slight revisions may need to be made to a few of the PTS assessment items.

### **Discussion of Findings: Research Question Two**

The analysis of learner perception, as measured through the Myself-As-A-Learner Scale (Burden, 1998), sought understanding into the ways in which self-perceptions about capabilities and intelligence drive motivation and overall achievement (Winner & Hetland, 2000b). A significant positive relationship between overall student learning (total matrix assessment scores) and student self-perceptions showed that possible connections exist between self-efficacy, confidence, and desire to learn in art and design classrooms that emphasize balance: inquiry, self-direction, and constructivism.

The Myself-As-A-Learner scale (Burden, 1998) provided an overall measure of individuals’ self-awareness while also informing students’ attitudes towards learning—essential data in the understanding of students’ capacity and desire to learn. This finding

provides important information regarding the impact of learner-centered classrooms, particularly those designed to be more learner-centered, on the affective components of the learning process. Particular attention must be given to school environments and their influence on beliefs and expectations about learning and the learner (Resnick, 1999). The literature supporting the affective aspects of learning including self-perception, desire to learn, empowerment, and motivation have been addressed thoroughly in the literature section of this paper.

### **Significance: Research Question One**

In order to equip students toward success in learning and life in the 21<sup>st</sup> century, there has been a recognized need for education environments that value deep, critical, creative, and practical thinking, with depth of understanding (Lipman, 2003; Perkins, 2005; Sternberg, 2008; Webb, 2005). High-stakes testing environments that have reinforced narrow conceptions of intelligence and memory-based skills, have instead been challenged to focus on developing students' quality of thinking (Darling-Hammond, 2008; Eisner, 2002; Gardner, 2007; Mednick, 1999; Sternberg, 2008). This study contributes to existing knowledge on quality thinking as defined through balanced intelligence and learning (Sternberg & Grigorenko, 2004), together with students' depth of knowledge (Webb, 2005).

The current study answered the call for more rigorous and “sophisticated methodologies” toward understanding the effects of teaching and learning environments on students' abilities to think flexibly and appropriately (Hetland & Winner, 2004, p. 47). It supported research showing that learner-centered environments that foster active

inquiry, student self-direction, and connection-making, also expand the thinking qualities of students in these classrooms (Caine & Caine, 1997; Claxton, 2006b; Collins & Stevens, 1982; Sternberg, 2008; Tsui, 2002).

Results from this study indicated that the assessments, when used within the matrix design, measured what was intended: quality thinking in critical, creative, and practical domains. While there is room for improvement on individual assessments and possibly the matrix design, significant positive correlations between overall matrix scores and a classroom's level of learner-centeredness reinforced the individual assessments as legitimate measures of their intended purpose. While not formal data collection, feedback solicited by the researcher about the teacher-scored assessments (PTS and CvTD) was positive. Teachers felt that their involvement in the scoring process caused them to think more deeply about their students' individual strengths and weaknesses and provided insight toward their reflective practices.

In this study, art and design classrooms that encouraged greater inquiry, self-direction, and connection-making (as constructs of learner-centeredness) led to significant positive correlations with students' qualities of thinking. This indicates the value of learner-centered practices in the arts toward the development of students' overall thinking skills and dispositions: analytical, creative, and practical. As suggested through this study, students' overall quality of thinking was best measured (QUAN) and observed (QUAL) in balance: critical, creative, and practical skills and dispositions, as held to a standard (complexity).

While there is still much work to be done, this study also contributes to recommendations for research that could inform and lead to best practice implementation regarding pedagogy, curriculum, and cultures of thinking in the arts. As a mixed model design, this research has led to the development of new assessment tools toward balanced thinking in the arts and emerging theories that incorporate quality thinking constructs with design thinking practices. The results from this study endorse developing theories as well as the “Quality Thinking Assessment Matrix” design used to assess students’ quality thinking.

### **Implications for 21<sup>st</sup> Century Best Practice**

As previously suggested, results from this study may serve to inform teachers and supervisors about learner-centered art instruction as it informs and aligns with 21<sup>st</sup> century learning goals fostering balance between innovation, synthetic thought, and real-world responsibility. In alignment with the research questions, learner-centered classrooms were those that employed inquiry, connection-making, and self-direction by students. Balanced, deep, and complex ways of thinking were indicators for quality thinking.

The relationship between students’ overall quality of thinking and a classroom’s level of learner-centeredness, showed the importance of the culture and environment on students’ potential success as learners and thinkers. Through both quantitative and qualitative findings, classrooms ranking higher scores for learner-centeredness possessed the common bond of (1) administrative support, (2) teachers who modeled enthusiasm



and a life-long love for learning, and (3) school-wide support for good thinking, inquiry, and collaborative, interdisciplinary teaching.

This finding lends support to the importance of shared vision on pedagogical and cultural impacts, especially where education is considered to be a collaborative, creative process. In this study, administrative support was notable in classrooms designed to be more learner-centered that subsequently nurtured students toward higher overall qualities of thinking (as represented through higher overall assessment matrix scores).

### **Implications for Art Education**

The arts in education are often overlooked as equals in training for a balance of students' thinking skills and dispositions, and research has been limited in how the arts train for a balance of critical and creative thinking (Bailin et al., 1999; Hokanson, 2007). Tension has existed within the field of art education with respect to the types of thinking that should be developed in arts classrooms, the importance of connection-making, and the degree of balance that should exist between creativity, criticality, and real-world responsibility (Cunliffe, 2007; Gardner, 2007; Lampert, 2006; Glassner & Schwarz, 2006; Sternberg, 2004; Weisberg, 1999). The current study's results suggest that infusion of best practice research toward the development of balanced thinking and overall cognitive development in the arts is beneficial to students (Darby & Catterall, 1994; Luftig, 2000).

The arts in education hold potential for nurturing students' critical, creative, and practical skills and dispositions (Craft, 2006; Sternberg, 2008). Art teachers are called to position themselves as leaders within their professional learning communities, by

incorporating best practice research toward students' increased balanced and quality thinking. As a whole, the field of art education is called to aim higher and be a leading force in the development of cognitive balance—not only for creative thinking, but also for equal development of analytical and social/emotional skill sets.

This study on quality thinking revealed at least two primary recommendations, which may also serve to influence 21<sup>st</sup> century teacher preparation programs in the arts. While the results of this study are not generalizable to all classrooms and all schools and have no statistical predictive power, they may imply that teachers and teaching environments which purposefully support (1) balanced thinking and dispositions, (2) constructivist practices, and (3) a culture of thinking and shared responsibility may positively support students' quality thinking. Design thinking models in the arts are needed for facilitating authentic, connected, self-directed, and deep investigations into meaningful concepts (Burnette, 2005; Burnette & Norman, 1997).

### **Significance: Research Question Two**

The assessment addressing the second research question for this study was fundamentally about giving voice to young people's self-perceptions about their learning. In this study, students' perceptions of their abilities and intelligence were greater in classrooms that were more learner-centered. This finding is important as self-perceptions can drive students' beliefs about their abilities (Bruner, 1996) and affect overall quality of thinking. Therefore, the link between higher self beliefs and overall quality of thinking is of statistical and personal significance to learning.

This finding supports research with respect to the importance of cultures of trust, respect, and caring for students' increased cognitive development, creativity, and social/emotional growth (Dai & Sternberg, 2004; McCombs, 1994a; Noddings, 1992; Resnick et al., 1997). Perhaps more importantly, it reinforces the impact of learner-centered classrooms toward the construction of students' self-concepts and self-efficacy (Bandura, 1989; Bruner, 1996; Stipek, 1996), which hold power for improving their overall capacity to learn and succeed.

### **Recommendations for Further Research**

As the research regarding the impact of learner-centered environments in the arts has been limited to date, it is suggested that future studies continue to explore this important factor toward the development of students' thinking and understanding. The finding of significant differences in quality of thinking between the classrooms in this study, as compared to levels of learner-centeredness, would be a foundation for future investigations into the nature of this relationship. A similar comparative study, conducted with a larger sample size, would provide more predictive value to this valuable research. This study should be repeated with a wider range of schools to verify the validity of the framework for describing school culture in a variety of settings. Other analyses are needed to determine whether hypothesized relationships are valid.

Five major recommendations are suggested for further research related to the current study. These recommendations are considered for the purpose of providing additional information to guide and support school administrators, educational leaders in the arts, and teachers.

First, the researcher recommends conducting a similar study towards more predictive value. It is suggested that the Quality Thinking Matrix (analytical, creative, practical skills and dispositions, plus overall balanced thinking) be administered to students toward predicting success in a high school Advanced Placement (AP) art course or other more traditional college entrance examinations (i.e., SAT or ACT).

Second, in order to further explore the effects of various types of learner-centered instruction on student achievement, the researcher recommends expanding the study using an experimental design. Three control groups, similar to a study designed by Sternberg, Torff, and Grigorenko (1998), could be considered. Students would receive instruction in one of three ways: (1) more traditional teacher-driven with more emphasis on the end product, (2) with a creative thinking emphasis that is largely student-driven, or (3) with a balanced emphasis on critical, creative, and practical thinking skills and dispositions. In the third control group it would be important for students to receive best practice, learner-centered instruction as explored in the current study. Students' achievement could be assessed with the Quality Thinking Matrix assessments designed for this study as well as traditional statewide mastery tests, comparing difference between the results. Due to aforementioned study results (Sternberg et al., 1998) and the current research study reported in this paper, the researcher would hypothesize that more balanced instruction would improve student performance on the Quality Thinking Matrix assessments, as well as on the traditional memory-based assessments.

Third, it would be valuable to the art and art/design education fields to conduct a comparative study that involves a more design thinking pedagogy and curriculum as

compared to a more traditional visual art experience. As suggested through the current research study, design thinking instruction would involve student-directed learning, connection-making, and inquiry-based practices and the development of a balance of critical, creative, and practical skills and dispositions. More specifically, the suggested future study would compare art and design classrooms that utilize the T-H-I-N-K framework (Appendix I) and theory base developed through the current research study, compared to art classrooms that do not utilize this framework. A mixed model design would be suggested for the benefit of drawing upon both quantitative results and qualitative elaboration. As with the current study, the recommended study could compare the Quality Thinking Matrix assessment total scores between groups.

Fourth, more balanced instruction and testing—as opposed to a primary focus on memory-based and analytical skills—has been found to influence the cognitive and affective growth of a broad diversity of students, not just the privileged or talented (Sternberg, 2008). The researcher recommends the implementation of a study to further understand how balanced instruction might serve to increase equity by reducing differences in test performance between groups (Sternberg, 2008). The Quality Thinking Matrix assessments should be used with a more diverse grouping of students (i.e., ethnic and/or socio-economic). It would then be important to compare overall matrix assessment results for this more diverse grouping to the performance of these students on a more traditional assessment measure (i.e., state-wide mandated test). This study would be best conducted on a school-wide level, not just in the arts.

Lastly, to further address the findings related to Research Question Two in this study, it is suggested that exploration into the impact of learner-centered instruction on student self-perceptions be expanded to include all arts disciplines. The affective dimensions of learning, toward students' increased overall capacity to learn deserve deeper inquiry in arts disciplines and have been undervalued (Claxton, 2007). The researcher also recommends that a study expanding upon student self-beliefs in the arts, should involve a mixed model design, for the expansion of both types of data. The mediating effects of motivation and self-esteem on students' realized academic achievement should be included in this inquiry.

### **Summary**

This research study supported theory in the area of balanced intelligence, toward the realization of students' increased capacity to learn and achieve (Claxton, 2007; Gardner, 2007; Sternberg & Grigorenko, 2004). In light of 21<sup>st</sup> century aims for education that encompass broader aims regarding student intelligence, this research adds to reformed definitions of aptitude not based on mathematical and analytical indicators or test-taking abilities alone (Gadsden, 2008; Gardner, 1999). Rather, analyses of this study suggest that students' overall quality of thinking should be viewed in terms of balance, the inclusion of dispositional factors, depth, and the impact of the overall learning environment. This research also suggests that intelligence is influenced by the thinking and learning culture in which students find themselves, and that those students who are in more learner-centered environments may also be better at thinking in balanced ways.

Additionally, it suggests that static, passive philosophies of learning and knowing should be replaced with constructivist epistemologies which include social, contextual, and affective facets of learning (Gadsden, 2008). Student self-beliefs, as positively correlated with classrooms ranking higher in learner-centeredness provide extra support for this claim.

Although this study, due to its small sample size, held no predictive power and its results are not generalizable, the significant positive correlation between students' higher-order thinking abilities and dispositions with a classroom's design for learner-centeredness, indicates the need for continued research in this area. Results from this study also reinforce the individual assessments used and developed, as legitimate measures for assessing quality thinking and suggest that student's quality of thinking, when measured in a balanced way, holds a noticeable *difference* for students in classrooms that embrace balanced thinking and learning practices.

## References

- Adams, M., Foutz, S., Luke, J. & Stein, J. (2007). *Summary: Thinking through art, Isabella Stewart Gardner museum school partnership program year 3 research results*. Institute for Learning Innovation: School Partnership Program. Retrieved June 12, 2009, from [http://www.gardnermuseum.org/education/tta/links/Year\\_3\\_Report.pdf](http://www.gardnermuseum.org/education/tta/links/Year_3_Report.pdf)
- Amabile, T. (1983). *The social psychology*.
- Amabile, T. (1996). *Creativity in context*. Boulder, CO: Westview.
- Amabile, T. (2001). Beyond talent: John Irving and the passionate craft of creativity. *American Psychologist*, 56(4), 333-336.
- American Psychological Association (APA) Work Group on Psychology in Education (1997). *Learner-centered psychological principles: A framework for school reform and redesign*. (Rev. Ed.). Washington, DC: American Psychological Association.
- Anderson, L., & Krathwohl, D. (Eds.). (2001). *A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives*. New York: Addison Wesley Longman.
- Aprill, A. (2001). Toward a finer description of the connection between arts education and student achievement. *Arts Education Policy Review*, 102(5), 25-26.
- Argyris, C., & Schön, D. (1996). *Organizational learning II: Theory, method and practice*. Reading, MA: Addison Wesley.
- Bailin, S., Case, R., Coombs, J., & Daniels, L. (1993). *A conception of critical thinking for curriculum, instruction and assessment*. Ministry of Education: Province of British Columbia.
- Bailin, S., Case, R., Coombs, J., & Daniels, L. (1999). Conceptualizing critical thinking. *Journal of Curriculum Studies*, 31(3), 285-302.
- Bandura, A. (1989). Human Agency in Social Cognitive Theory, *American Psychologist*, 44 (9), 1175-1184.
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: WH Freeman.
- Beattie, D. (2000). Creativity in art: The feasibility of assessing current conceptions in the school context. *Assessment in Education*, 7(2), 175-192.



- Bransford, J., Brown, A., & Cocking, R. (Eds.) (2000). *How people learn: Brain, mind, experience and school*. Washington, DC: National Academy Press.
- Bruner, J. (1961). The act of discovery. *Harvard Educational Review*, 31(1), 21-32.
- Burden, R. (2000). *Myself as a learner scale*. Berkshire: NFER-Nelson.
- Bruner, J. (1966). *Toward a theory of instruction*. Cambridge, MA: Harvard University Press.
- Bruner, J. (1994). *Acts of meaning*. Cambridge, MA: Harvard University Press.
- Bruner, J. (1996). *The culture of education*. Boston: Harvard University Press.
- Burden, R. (1998). Assessing children's perceptions of themselves as learners and problem-solvers: The construction of the myself-as-a-learner scale (MALS). *School Psychology International*, 19(4), 291-305.
- Burnette, C. (2005). *IDESIGN: Seven ways of design thinking, A teaching resource*. Retrieved June 15, 2009, from <http://www.idesignthinking.com/main.html>
- Burnette, C., & Norman, J. (1997). *Design for thinking DK-12*. Tucson, AZ: Crizmac Art and Cultural Materials.
- Burton, J., Horowitz, R., & Abeles, H. (1999). Learning through the arts: Curriculum implications. In E. Fiske (Ed.), *Champions of change: The impact of the arts on learning* (pp. 35-46). Washington, D.C.: The Arts Education Partnership. Retrieved February 1, 2008, from <http://artsedge.kennedy-center.org/champions/>
- Burton, J., Horowitz, R., & Abeles, H. (2000). Learning in and through the arts: The question of transfer. *Studies in Art Education*, 41(3), 228-257.
- Caine, R., & Caine, G. (1994). *Making connections: Teaching and the human brain*. Menlo Park, CA: Addison Wesley Longman.
- Caine, R., & Caine, G. (1997). *Education on the edge of possibility*. Alexandria, VA: Association for Supervision and Curriculum Development.
- Canadian Education Association (CEA) (2008). Creativity: A forgotten skill? CEA: *Education Canada*. Retrieved February 15, 2008, from <http://www.cea-ace.ca/pub.cfm?subsection=edu&page=arc&subpage=fal03>
- Carr, M., & Claxton, G. (2002). Tracking the development of learning dispositions. *Assessment in Education*, 9(1), 9-37.
- Catterall, J. (1998). Does experience in the arts boost academic achievement? A response to Eisner. *Art Education*, 51(4), 6-11.

- Catterall, J. (2002). The arts and the transfer of learning. In R. Deasy (Ed.), *Critical links: Learning in the arts and student academic and social development* (pp. 151–157). Washington, DC: Arts Education Partnership.
- Catterall, J. (2009). *Doing well and doing good by doing art*. Los Angeles: I-Group Books.
- Chapman, L. (2004). No child left behind in art? *Arts Education Policy Review*, 106 (2), 3-15.
- Chart, H., Grigorenko, E., & Sternberg, R. (2006). The Aurora Battery: Toward better identification of giftedness. In C. Callahan & J. Plucker (Eds.), *What the research says about: An encyclopedia of research on gifted education*. Waco, TX: Prufrock Press.
- Claxton, G. (2002). *Building learning power: Helping young people become better learners*. Bristol, UK: PLO Ltd.
- Claxton, G. (2006a). Thinking at the edge. *Cambridge Journal of Education*, 36(3), 351-362.
- Claxton, G. (2006b). *Expanding the capacity to learn: A new end for education?* Warwick University, UK: Proceedings from the British Educational Research Association Annual Conference.
- Claxton, G. (2007). Expanding young people's capacity to learn. *British Journal of Educational Studies*, 55(2), 115-134.
- Collins, A., & Stevens, A. (1982). Goals and strategies of inquiry teachers. In R. Glaser (Ed.), *Advances in instructional psychology* (Vol. 2). Hillsdale, NJ: Erlbaum.
- Consortium of National Arts Education Organization (1994). *National standards for arts education*. Reston, VA: Music Educators National Conference.
- Copeland, M. (2005). *Socratic circles: Fostering critical and creative thinking*. Portland, MN: Stenhouse Publishers
- Costa, A. (2001). Habits of mind. In A. Costa (Ed.), *Developing minds: A resource book for teaching thinking* (3rd ed.). Alexandria, VA: Association for Supervision and Curriculum Development.
- Costa, A., & Kallick, B. (2004). *Assessment Strategies for Self-Directed Learning*. Thousand Oaks, CA: Corwin Press
- Crabbe, D. (1993). Fostering autonomy from within the classroom: The teacher's responsibility. *System*, 21(4), 443-452.

- Craft, A. (2001). Little c creativity. In A. Craft., B. Jeffrey & M. Leibling (Eds.). *Creativity in education* (pp. 45-61). London: International Publishing.
- Craft, A. (2006). Fostering creativity with wisdom. *Cambridge Journal of Education* , 36(3), 337-350.
- Cross, N. (1999a). Design research: A disciplined conversation. *Design Issues*, 15(2).
- Cross, N. (1999b). Natural intelligence in design. *Design Studies*, 20(1).
- Cross, N. (2007). *Designerly ways of knowing*. Basel, Switzerland: Birkhäuser Verlag AG
- Csikszentmihalyi, M. (1988). Society, culture, and person: A systems view of creativity. In R. Sternberg (Ed.), *The nature of creativity* (p. 325-339). Cambridge, MA: Cambridge University Press.
- Csikszentmihalyi, M. (1990). The domain of creativity. In M. A. Runco & R. S. Albert (Eds.), *Theories of Creativity* (pp. 190-212). Newbury Park, California: Sage Publications.
- Csikszentmihalyi, M. (1996). *Creativity: Flow and the psychology of discovery and invention*. New York: Harper Collins.
- Cunliffe, L. (2007). *Using assessment in knowledge-rich forms of learning and creativity to nurture self-regulated strategic intelligence*. Paper presented at 2007 University of Wales Institute Conference: Creativity or Conformity? Building Cultures of Creativity in Higher Education, Cardiff, Wales, UK. Abstract retrieved June 25, 2010, from <http://www.creativityconference07.org/abstracts.php>
- Dai, D., & Sternberg, R. (Eds.). (2004). *Motivation, emotion, and cognition: Integrative perspectives on intellectual functioning and development*. Mahwah, NJ: Lawrence Erlbaum Associates, Publishers.
- Damasio, A. (1998). Emotion in the perspective of an integrated nervous system. *Brain Research Review*, 26, 84-86.
- Damasio, A. (2001). Some notes on brain, imagination and creativity. In K. Pfenninger & V. Shubik (Eds.), *The origins of creativity* (pp. 59-61). Oxford: Oxford University Press.
- Dana Foundation (2008). *Learning, arts, and the brain*. Retrieved June 19, 2009, from [www.dana.org](http://www.dana.org)

- Darby, J., & Catterall, J. (1994). The 4<sup>th</sup> r: The arts and learning. *Teachers College Record*, 96(2), 299-308.
- Darling-Hammond, L. (1997). *The right to learn: A blueprint for creating schools that work*. San Francisco: Jossey Bass.
- Darling-Hammond, L. (2008). What does it mean to be internationally competitive?: High performing nations integrate curriculum instruction and assessment to improve both teaching and learning. *Phi Delta Kappan*; 9 (4), 263-271.
- Deasy, R. (Ed.) (2002). *Critical links: Learning in the arts and student academic and social development*. Washington, DC: Arts Education Partnership.
- DeMoss, K., & Morris, T. (2002). *How arts integration supports student learning. Students shed light on the connections*. University of New Mexico. Retrieved August 30, 2009, from <http://www.capeweb.org/demoss.pdf>
- Dewey, J. (1933). *How we think: A restatement of the relation of reflective thinking to the educative process* (Rev. ed.). Boston: D C Heath.
- Dewey, J. (1934). *Art as Experience*. New York: Perigree Books.
- Dewey, J. (1938). *Logic: The theory of inquiry*. New York: Henry Holt.
- Dewey, J. (1963). *Experience and education*. New York: Collier Books. (Original work published 1938).
- Dewey, J. (1966). *Democracy and education*. Toronto: Collier-Macmillan.
- Dorn, C., Madeja, S., & Sabol, F. (2004). *Assessing expressive learning: A practical guide for teacher-directed, authentic assessment in K-12 visual arts education*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Dweck, C., & Leggett, E. (1988). A social cognitive approach to motivation and personality. *Psychological Review*, 95, 256–273.
- Dweck, C. (1995). *Self theories: Their role in motivation, personality, and development*. Philadelphia, PA: Psychology Press.
- Education Goals Panel (1991). *The national education goals report: Building a nation of learners*. Washington, DC: U.S. Printing Office.
- Eisner, E. (1994). *Cognition and curriculum reconsidered* (2nd ed). New York: Teachers College Press.

- Eisner, E. (1998). Does experience in the arts boost academic achievement? *Art Education* 51(1), 7-12.
- Eisner, E. (2002). *Arts and creation of mind*. New Haven, CT: Yale University Press.
- Efland, A. (2004). Art education as imaginative cognition. In E. Eisner & M. Day (Eds.), *Handbook of Research and Policy in Art Education* (pp. 751-773). Mahwah, NJ: Lawrence Erlbaum and the National Art Education Association.
- Efland, A. (2002). *Art and cognition: Integrating the visual arts in the curriculum*. New York: Teachers College Press/Columbia University.
- Elliott, A., & Dweck, C. (Eds.). (2005). *Handbook of competence and motivation*. New York: Guilford Press.
- Ennis, R. (1996). Critical thinking dispositions: Their nature and assessability. *Informal Logic*, 18 (2 & 3), 165-82.
- Erickson, H. (2006). *Concept-based curriculum and instruction for the thinking classroom*. Thousand Oaks, CA: Corwin Press.
- Facione, P., & Facione, N. (1992). *The California critical thinking disposition inventory*. Millbrae, CA: California Academic Press.
- Facione, P., Sanches, C. , Facione, N., & Gainen, J. (2000). The disposition toward critical thinking: Its character, measurement, and relationship to critical thinking skills. *Informal Logic*, 20(1), 61-84.
- Fisher, A., & Rush, L. (2008). Conceptions of learning and pedagogy: developing trainee teachers' epistemological understandings. *The Curriculum Journal*, 19(3), 227–238.
- Florida, R. (2003). *The rise of the creative class. And how it is transforming work, leisure, community and everyday life*. New York: Basic Books.
- Freidman, K. (2003). Theory construction in design research: Criteria, approaches, and methods. *Design Studies*, 24(6), 507-522.
- Fullan, M. (2001). *The new meaning of educational change* (3<sup>rd</sup> ed.). New York: Teachers College Press.
- Gadsden, V. (2008). The arts and education: Knowledge generation, pedagogy, and the discourse of learning. *Review of Research in Education*, 32(1), 29- 61.
- Gardner, H. (1983). *Frames of mind: The theory of multiple intelligence*. New York: Basic Books.

- Gardner, H. (1993). *Creating minds*. New York: Harper Collins.
- Gardner, H. (1999). *Intelligence Reframed: Multiple Intelligences for the 21<sup>st</sup> Century*. New York: Basic Books.
- Gardner, H. (2007). *Five minds for the future*. Boston: Harvard Business School Press.
- Gardner, H., Krechevsky, M., Sternberg, R., & Okagaki, L. (1994). Intelligence in context: Enhancing students' practical intelligence for school. In K. McGilly (Ed.), *Classroom lessons: Integrating cognitive theory and classroom practice* (pp. 105-127). Cambridge, MA: MIT Press.
- Gazzaniga, M. (2008). *Learning, arts, and the brain: The Dana consortium report on arts and cognition*. New York: Dana Press. Retrieved April 1, 2009, from [www.dana.org](http://www.dana.org)
- Getzels, J., & Jackson, P. (1962). *Creativity and intelligence: Explorations with gifted students*. NY: Wiley.
- Giancarlo, C., Blohm, S., & Urdan, T. (2004). Assessing secondary students' dispositions toward critical thinking: Development of the California measure of mental motivation. *Educational and Psychological Measurement*, 64(2), 347-364.
- Giancarlo, C., & Facione, P. (2001). A look across four years at the disposition toward critical thinking among undergraduate students. *The Journal of General Education*, 50(1), 29-55.
- Giudici, C., Krechevsky, M., & Rinaldi, C. (Eds.). (2001). *Making learning visible: Children as individual and group learners*. Reggio Emilia, Italy: Reggio Children.
- Glassner, A., & Schwarz, B. (2006). What stands and develops between creative and critical thinking? Argumentation? *Thinking Skills and Creativity*, 2, 10-18.
- Goldberg, M. (2001). *Arts and learning: An integrated approach to teaching and learning in multicultural and multilingual settings* (2<sup>nd</sup> ed). New York: Longman/Addison Wesley.
- Goleman, D. (1996). *Emotional Intelligence*. London: Bloomsbury.
- Grabinger, R., & Dunlap, J. (1995). Rich environments for active learning: A definition. *Association for Learning Technology Journal*, 3(2), 5-34.
- Gude, O. (2007). Principles of possibility: Considerations for a 21<sup>st</sup>-century art & culture curriculum. *Art Education*, 60(1), 6-17.

- Guilford, J. (1967). *The nature of human intelligence*. NY: McGraw-Hill.
- Gullatt, D. (2007). Research links the arts with student academic gains. *The Educational Forum* 71, 211-220.
- Gullatt, D. (2008). Enhancing student learning through arts integration: Implications for the profession. [Electronic version]. *The High School Journal*, 91(4), 12-25.
- Halpern, D. (1996). *Thought and knowledge: An introduction to critical thinking*. Mahwah, NJ.: Erlbaum Associates.
- Halpern, D. (1998). Teaching critical thinking for transfer across domains: Dispositions, skills, structure training, and metacognitive monitoring. *American Psychologist*, 53(4), 449-455.
- Halpern, D. (2006). The nature and nurture of critical thinking. In R. Sternberg (Ed.), *Critical thinking in psychology*. Cambridge, MA: Cambridge University Press.
- Hamblen, K. (1997). Theories and research that support art instruction for instrumental outcomes. *Arts Education Policy Review*, 98(3), 27-33.
- Harpaz, Y. (2007). Approaches to teaching thinking: Toward a conceptual mapping of the field. *Teachers College Record*, 109(8).
- Heid, K. (2005). Aesthetic development: A cognitive experience. *Art Education*, 58(5), 48-53.
- Hetland, L., & Winner, E. (2004). Cognitive transfer from arts education to non-arts outcomes: Research evidence and policy implications. In E. Eisner and M. Day (Eds.), *Handbook on Research and Policy in Art Education*. Reston, VA: National Art Education Association.
- Hetland, L., Winner, E., Veenema, S., & Sheridan, K. (2007). *Studio thinking: The real benefits of visual arts education*. New York: Teachers College Press.
- Hickey, M. (2001). An application of Amabile's consensual assessment technique for rating the creativity of children's musical compositions. *Journal of Research in Music Education*, 49(3), 234-244.
- Hokanson, B. (2007, January 8). *By measure: Creativity in design*. Paper presented at 2007 University of Wales Institute Conference: Creativity or Conformity? Building Cultures of Creativity in Higher Education, Cardiff, Wales, UK. Abstract retrieved June 25, 2010, from <http://www.creativityconference07.org/abstracts.php>

- Hopkins, D. (2006). *Personalising Education*. Paris: Organization for Economic Co-Operation and Development Publishing.
- Housen, A. (2001). Aesthetic thought, critical thinking and transfer. *Arts and Learning Research Journal*, 18(1), 99–131.
- Illinois State Board of Education (2004). *Illinois learning standards: Social/Emotional Learning (SEL)*. Retrieved September 1, 2009, from Illinois State Board of Education, Illinois Assessment Frameworks: [http://www.isbe.state.il.us/ils/social\\_emotional/standards.htm](http://www.isbe.state.il.us/ils/social_emotional/standards.htm)
- Immordino-Yang, M., & 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.
- International Baccalaureate Program (IBP) (2009a). *The middle years programme: A basis for practice*. Cardiff, Wales UK: International Baccalaureate. Retrieved June 21, 2009, from [http://occ.ibo.org/ibis/documents/myp/m\\_g\\_mypxx\\_mon\\_0901\\_1\\_e.pdf](http://occ.ibo.org/ibis/documents/myp/m_g_mypxx_mon_0901_1_e.pdf)
- International Baccalaureate Program (2009b). *The primary years programme: Making the PYP happen, A curriculum framework for international primary education*. Cardiff, Wales UK: International Baccalaureate.
- Isaksen, S., Murdock, M., Firestein, R., & Treffinger, D. (Eds.). (1993). *Understanding and recognizing creativity: The emergence of a discipline*. Norwood, N.J.: Ablex, p. 34-99.
- Jensen, E. (2008). A fresh look at brain-based education. *Phi Delta Kappan*; 89 (6): 409-417.
- Jensen, E. (2008). A fresh look at brain-based education. *Phi Delta Kappan*; 89 (6): 409-417.
- Johnson, D., Johnson, R., & Holubec, E. (1994). *The New Circles of Learning: Cooperation in the Classroom and School*. Association for Supervision & Curriculum Development.
- Johnson, R., & Onwuegbuzie, A. (2004). Mixed methods research: A research paradigm whose time has come. *Educational Researcher*, 33(7), 14-26.
- Kauchak, D., & Eggen, P. (2006). *Learning and teaching: Research-based methods* (5th ed.). Needham Heights, MA: Allyn & Bacon.
- Kempermann, G., Wiskott, L., & Gage, F. (2004). Functional significance of adult neurogenesis. *Current Opinion in Neurobiology*, April, p. 2.



- King, A. (1994). Inquiry as a tool in critical thinking. In D. Halpern & Associates (Eds.), *Changing college classrooms: New teaching and learning strategies for an increasingly complex world* (pp. 13-38). San Francisco: Jossey-Bass Publishers.
- Krug, D., & Cohen-Evron, N. (2000). Curriculum Integration Positions and Practices in Art Integration. *Studies in Art Education*, 41(3), 259-277.
- Lampert, N. (2006). Critical thinking dispositions as an outcome of arts education. *Studies in Art Education*, 47(3), 215-228.
- Langer, E. (1989). *Mindfulness*. Reading, MA: Addison-Wesley.
- Langer, E. (1993). A mindful education. *Educational Psychologist*, 28, 43-50.
- Learning and Teaching Scotland- LTS (2008). "Creativity in education: Learning to think in new ways." Scottish Executive Education Department. Retrieved January 16, 2008, from <http://www.ltscotland.org.uk/creativity/>
- Lincoln, Y., & Guba, E. (1985). *Naturalistic inquiry*. Beverly Hills, CA: Sage Publications.
- Lipman, M. (2003). *Thinking in education* (2<sup>nd</sup> ed.). Cambridge, UK: Cambridge University Press.
- Luftig, R. (2000). An investigation of an arts infusion program on creative thinking, academic achievement, affective functioning, and arts appreciation of children at three grade levels. *Studies in Art Education*, 41(3), 208-227.
- Luftig, R. (1994). *The schooled mind: do the arts make a difference? An empirical evaluation of the Hamilton Fairfield Spectra A+ program, 1992-93*. Hamilton, OH: Hamilton Fairfield Arts Association. (ERIC Document No. ED375023).
- Lynch, P. (2007). Making meaning many ways: An exploratory look at integrating the arts with classroom curriculum. *Art Education*, 60(4), 33-38.
- Marshall, J. (2005). Connecting art, learning and creativity: A case for curriculum integration. *Studies in Art Education*, 46(3), 227-241.
- Marshall, J. (2006). Substantive art integration= Exemplary art education. *Art Education*, 59(6), 17-24.
- Marzano, R. (2003). *What works in schools: Translating research into action*. Alexandria, VA: Association for Supervision and Curriculum Development.

- McCombs, B. (1994a). *Development and validation of the learner-centered psychological principles*. Aurora, CO: Mid-Continent Regional Educational Laboratory (McREL).
- McCombs, B. (1994b). Strategies for assessing and enhancing motivation: Keys to promoting self regulated learning and performance. In H. F. O'Neil & M. Drillings (Eds.), *Motivation: Theory and research* (pp. 49–70). Hillsdale, NJ: Erlbaum.
- McCombs, B., & Marzano, R. (1990). Putting the self in self-regulated learning: The self as agent in integrating will and skill. *Educational Psychologist*, 25(1), 51-69.
- McCombs, B., & Whisler, J. (1997). *The learner-centered classroom and school: Strategies for increasing student motivation and achievement*. San Francisco: Jossey Bass Publishers.
- Mednick, F. (1999). Worldwide perspectives on the educated teen for the 21<sup>st</sup> Century. Mercer Island, WA: Teachers Without Borders. (ERIC Document No. ED454177).
- Melnick, S., Witmer, J., & Strickland, M. (2008). Cognition and student learning through the arts. University of CT: *Northeastern Educational Research Association (NERA) Conference Proceedings 2008*.
- Miles, M., & Huberman, M. (1994). *Qualitative data analysis: An expanded sourcebook*. Thousand Oaks, CA: Sage.
- Mishook, J., & Kornhaber, M. (2006). Arts integration in an era of accountability. *Arts Education Policy Review*, 107(4), 3-11.
- Moga, E., Burger, K., Hetland, L., & Winner, E. (1999). Does studying the arts engender creative thinking? Evidence for near but not far transfer. *Journal of Aesthetic Education*, 34(3/4), 91-103.
- Moseley, D., Baumfield, V. Elliott, J., Gregson, M. Higgins, S. Miller, J., & Newton, D. (2005). *Frameworks of thinking: A handbook for teaching and learning*. Cambridge, UK: Cambridge University Press.
- Murray, C., & Herrnstein, R. (1994). *The bell curve: Intelligence and class structure in American life*. New York: Free Press.
- National Commission on Excellence in Education (1983). *A nation at risk: The imperative for educational reform*. Washington, DC: Department of Education.

- National Curriculum in Action (NCA) (2008). *Creativity: Find it, promote it*. Retrieved February 16, 2008, from the Secretary of State for Education and Skills (UK): <http://www.ncaction.org.uk/creativity/about.htm>
- Nelson, C. (2001). The arts and education reform: Lessons from a four-year evaluation of the A+ schools program, 1995-1999. *Executive Summary*. Winston-Salem, NC: Thomas S. Kenan Institute for the Arts.
- Nicols, J. (2006). Empowerment and relationships: A classroom model to enhance student motivation. *Learning Environments Research*, 9(2), 149-161.
- Noddings, N. (1997). A Morally Defensible Mission for Schools in the 21st Century. In E. Clinchy (Ed.), *Transforming Public Education: A New Course for America's Future* (pp. 27-37). New York: Teachers College Press.
- Noddings, N. (1992). *The challenge to care in schools: An alternative approach in education*. New York: College Press.
- Norman, J. (2000). *Design as a framework for innovative thinking and learning: How can design thinking reform education*. Abstract of a Keynote address to IDATER2000 (2000), Department of Design and Technology, Loughborough University. Abstract retrieved May 24, 2009, from <https://dspace.lboro.ac.uk/dspace-jspui/bitstream/2134/1371/3/norman2000.pdf>
- O'Fallon, D. (2006). Observations, perspectives, and questions on arts and education. *Teaching Artist Journal*, 4(2), 76-83.
- Owens, R. & Valesky, T. (2007). *Organizational behavior in education*. Boston: Allyn and Bacon.
- Parsons, M. (2004). Art and integrated curriculum. In E. Eisner & M. Day (Eds.), *Handbook of Research and Policy in Art Education* (pp. 775-594). Mahwah, NJ: Lawrence Erlbaum Associates.
- Paul, R. (1993). *Critical thinking: What every person needs to survive in a rapidly changing world* (3<sup>rd</sup> ed.). Santa Rosa, CA: The Foundation for Critical Thinking.
- Paul, R., & Elder, L. (2006). Critical thinking: The nature of critical and creative thought. *Journal of Developmental Education*, 30 (2), 34-36.
- Perkins, D. (1990). The nature and nurture of creativity. In B.F. Jones & L. Idol (Eds.), *Dimensions of Thinking and Cognitive Instruction* (pp. 415-441). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Perkins, D. (1995). *Outsmarting IQ: The emerging science of learnable intelligence*. New York: The Free Press.

- Perkins, D. (1998). Learning for understanding in individuals and organizations. In D. Wilbur (Ed.), *McREL: A noteworthy account of the 1997 McREL conference, Exploring beliefs and research to promote thoughtful practice*. Retrieved May 30, 2009, from <http://www.mcrel.org>
- Perkins, D. (2001). Embracing babel: The prospects of instrumental uses of the arts for education. In E. Winner & L. Hetland (Eds.), *Beyond the soundbite: Arts education and academic outcomes* (pp. 117-124). Los Angeles: J. Paul Getty Trust.
- Perkins, D., Jay, E., & Tishman, S. (1993). Beyond abilities: A dispositional theory of thinking. *Merrill Palmer Quarterly*, 39(1), 1-21.
- Perkins, D., & Ritchhart, R. (2004). When is good thinking? In D. Dai & R. Sternberg (Eds.), *Motivation, Emotion and Cognition: Integrative Perspectives on Intellectual functioning and Development* (pp. 351-384). Mahwah, NJ: Erlbaum.
- Perkins, D., Tishman, S., Ritchhart, R., Donis, K., & Andrade, A. (2000). Intelligence in the wild: A dispositional view of intellectual traits. *Educational Psychology Review*, 12, 269-293
- Piaget, J. (1952). *The origins of intelligence in children*. New York: Basic Books.
- Piaget, J. (1978). *Success and understanding*. Cambridge, MA: Harvard University Press.
- Pink, D. (2005). *A whole new mind: Moving from the information age to the conceptual age*. New York: Riverhead Books.
- Pintrich, P. (1999). The role of motivation in promoting and sustaining self-regulated learning. *International Journal of Educational Research*, 31, 459-470.
- Pitri, E. (2003). Conceptual problem solving during artistic representation. *Art Education*, 56 (4), 19-23.
- Plano Clark, V., & Creswell, J. (2008). *The mixed methods reader*. Los Angeles: Sage Publications.
- Posner, M. (1994). Attention: the mechanisms of consciousness. *Proceedings of the National Academy of Sciences of the USA*, 91(16), 7398-7403.
- Posner, M., Rothbart, M., Sheese, B., & Kieras, J. (2008). How arts training influences cognition. In C. Asbury & B. Rich (Eds.), *Learning, Arts, and the Brain: The Dana Consortium Report on Arts and Cognition* (pp. 1-10). New York: Dana Press. Retrieved June 25, 2010 from [www.dana.org](http://www.dana.org)

- Project Zero and Reggio Children (2001). *Making learning visible: Children as individual and group learners*. Cambridge, MA: Harvard Project Zero and Reggio Children.
- Qualifications and Curriculum Authority (QCA) (2009). *Personal, learning, and thinking skills*. Retrieved June 29, 2009, from the Qualifications and Curriculum Authority Web site (UK): <http://curriculum.qca.org.uk/key-stages-3-and-4/skills/plts/index.aspx>
- Rabkin, N., & Redmond, R. (2006). *The arts make a difference*. Alexandria, VA: Association of Supervision and Curriculum Development.
- Rack, H. (2005). Jean-Jacques Rousseau: 1712-78. In J. Palmer (Ed.), *Fifty major thinkers on education*. New York: Routledge.
- Resnick, L. (1999). Making America smarter. *Education Week Century Series*, 18(40), 38-40.
- Resnick, L. (1987). *Education and learning to think*. Washington, DC: National Academy Press.
- Resnick, L., & Hall, M. (2000, 2005). *Principles of learning for effort-based education*. Pittsburgh: Institute for Learning, Learning Research and Development Center, University of Pittsburgh.
- Resnick, L., & Hall, M. (1998). Learning organizations for sustainable educational reform. *Daedalus*, Boston, 127(4), 89-119.
- Resnick, L., & Klopfer, L. (Eds.). (1989). *Toward the thinking curriculum: Current cognitive research*. Alexandria, VA: Association of Supervision and Curriculum Development.
- Resnick, L., & Nelson-LeGall, S. (1997). Socializing intelligence. In L. Smith, J. Dockrell & P. Tomlinson (Eds.), *Piaget, Vygotsky and beyond: Future issues for developmental psychology and education*. New York: Routledge.
- Ritchhart, R. (2001). From IQ to ICE: A dispositional view of intelligence. *Roeper Review*, 23(3), 143-150.
- Ritchhart, R. (2002). *Intellectual character: What it is, why it matters and how to get it*. San Francisco: Jossey Bass.
- Ritchhart, R., & Palmer, P. (2003). *Tools for assessing cultures of thinking. Looking at opportunities*. Retrieved June 15, 2010, from the Harvard University Visible Thinking Research Web site: [www.pz.harvard.edu/vt](http://www.pz.harvard.edu/vt)

- Ritchhart, R., & Perkins, D. (2000). Life in the mindful classroom: Nurturing the disposition of mindfulness. *Journal of Social Issues*, 56(1), 27- 47.
- Ritchhart, R., Robinson, K. (2001). *Out of our minds: Learning to be creative*. West Sussex: Capstone Publishing Limited.
- Runco, M. (1990). Implicit theories and ideational creativity. In M. Runco & R. Albert (Eds.), *Theories of creativity* (pp. 234-252). Newbury Park, California: Sage Publications.
- Ruppert, S. (2006). *Critical Evidence how the arts benefit student achievement*. Washington, DC: National Assembly of States Arts Agencies (NASAA). Retrieved May 14, 2009, from <http://www.nasaa-arts.org/publications/critical-evidence.pdf>
- Russell, J. & Zembylas, M. (2007). Arts integration in the curriculum: A review of research and implications for teaching and learning. In L. Bresler (Ed.), *Springer international handbook of research in arts education* (pp. 287-301). Dordrecht, Netherlands: Springer.
- Sahasrabudhe, P. (2006). Design for learning through the arts. *International Journal of Education through Art*, 2(2), 77-92.
- Sayers, D. (1947). *The lost tools of learning*. London: Methuen & Co. Ltd. Retrieved February 7, 2007, from <http://www.gbt.org/text/sayers.html>
- Scardamalia, M., & Bereiter, C. (1991). Higher levels of agency for children in knowledge building: a challenge for the design of new knowledge media. *The Journal of the Learning Sciences*, 1(1), 37-68.
- Secretary's Commission on Achieving Necessary Skills (1991). *What work requires of schools: A SCANS report for America 2000*. Washington D.C.: US Department of Labor.
- Seidel, K. (2001). Many issues, few answers—the role of research in K-12 arts education. *Arts Education Policy Review*, 103(2), 19-22.
- Senge, P. (1990). *The fifth discipline*. New York: Doubleday.
- Senge, P., Cambron-McCabe, N., Lucas, T. Smith, B., Durrone, J., & Kleiner, A. (2000). *Schools that learn. A fifth discipline fieldbook for educators, parents, and everyone who cares about education*. New York: Doubleday.
- Silvia, P. (2007). Another look at creativity and intelligence: Exploring higher-order models and probable confounds. *Personality and Individual Differences*, 44 (2008), 1012–1021.

- Singer, J. (1999). Imagination. In M. Runco & S. Pritzker (Eds). *Encyclopedia of creativity* (pp. 184-204). San Diego, CA: Academic Press.
- Smilan, C. (2007). The creative art [of] education. *International Journal of Social Sciences*, 2(4), 242-249.
- Smithrim, K., & Upitis, R. (2005). Learning through the arts: Lessons of engagement. *Canadian Journal of Education*, 28(1-2), 109-127.
- Snow, R. (1992). *Aptitude theory: Yesterday, today, and tomorrow*. *Educational Psychologist*, 27, 5-32.
- Sternberg, R. (1997). The concept of intelligence and its role in lifelong learning and success. *American Psychologist*, 52, 1030–1037.
- Sternberg, R. (Ed.). (1998). *The handbook of creativity*. Cambridge, UK: Cambridge University Press.
- Sternberg, R. (1999a). The theory of successful intelligence. *Review of General Psychology*, 3, 292-316.
- Sternberg, R. (1999b, December 1). *Teaching and assessing for successful intelligence*. Retrieved June 21, 2010, from [http://www.cdl.org/resource-library/articles/teaching\\_assessing.php?type=author&id=31](http://www.cdl.org/resource-library/articles/teaching_assessing.php?type=author&id=31)
- Sternberg, R. (2001). Why schools should teach for wisdom: The balance theory of wisdom in educational settings. *Educational Psychologist*, 36(4), 227-245.
- Sternberg, R. (2003a). Creative thinking in the classroom. *Scandinavian Journal of Educational Research*, 47(3), 325-338.
- Sternberg, R. (2003b). Teaching for successful intelligence: Principles, practices, and outcomes. *Educational and Child Psychology*, 20(2), 6-18.
- Sternberg, R. (2008). Increasing academic excellence and enhancing diversity are compatible goals. *Educational Policy*, 22(4), 487-514.
- Sternberg, R., & Grigorenko, E. (2000). *Teaching for successful intelligence*. Arlington Heights, IL: Skylight
- Sternberg, R., & Grigorenko, E. (2004). Successful intelligence in the classroom. *Theory into Practice*, 43(4), 274-280.
- Sternberg, R., & Lubart, T. (1999). The concept of creativity: Prospects and paradigms. In R.

- Sternberg, R., & O'Hara, L. (1999). Creativity and intelligence. In R. Sternberg (Ed.), *The handbook of creativity* (pp. 251–272). Cambridge, UK: Cambridge University Press.
- Sternberg, R., & the Rainbow Project Collaborators (2006). The rainbow project: Enhancing the SAT through assessments of analytical, practical, and creative skills. *Intelligence*, *34*(4), 321-350.
- Sternberg, R., Torff, B., & Grigorenko, E. (1998). Teaching triarchically improves school achievement. *Journal of Educational Psychology*, *90*, 374-384.
- Sternberg, R., & Williams, W. (1996). *How to develop student creativity*. Alexandria, VA: Association for Supervision and Curriculum Development.
- Stewart, M., & Walker, S. (2005). *Rethinking the curriculum in art*. Worcester, MA: Davis Publications.
- Stiggins, R. (1987). Design and development of performance assessment. *Educational Measurement: Issues and Practices*, Fall, 33–42.
- Stiggins, R., Rubel, E., & Quellmalz, E. (1988). *Measuring thinking skills in the classroom* (Rev. ed.). Washington, D.C.: NEA Professional Library.
- Stipek, D. (2002). *Motivation to learn* (4th ed.). Boston: Allyn and Bacon.
- Stripling, B. (2003). Inquiry-Based learning. In B. Stripling & S. Huges-Hassell (Eds.), *Curriculum connections through the library* (pp. 3-39). Westport, CT: Libraries Unlimited.
- Strom, R., & Strom, P. (2002). Overcoming limitations of cooperative learning among community college students. *Community College Journal of Research and Practice*, *26*, 123-139.
- Sylwester, R. (1995). *A celebration of neurons: An educator's guide to the human brain*. Alexandria, VA: Association of Supervision and Curriculum Development.
- Sylwester, R. (2003). *A biological brain in a cultural classroom: Enhancing cognitive and social development through collaborative classroom management*. Thousand Oaks, CA: Corwin Press.
- Tashakkori, A., & Teddlie, C. (1998). *Mixed methodology: Combining qualitative and quantitative approaches*. Applied Social Research Methods Series (Vol.46). Thousand Oaks, CA: Sage Publishers.
- Taylor, P., Carpenter, B., & Morris, C. (2006). *Interdisciplinary approaches to teaching art in high school*. Reston, VA: National Art Education Association.



- The Learning Organization, TLO (UK) (2004). *Building learning power*. Retrieved June 13, 2010, from <http://www.tlold.co.uk/buildinglearningpower.php>
- Tishman, S., MacGillivray, D., & Palmer, P. (2002). Investigating the educational impact and potential of the museum of modern arts' visual thinking curriculum: Final report. In R. Deasy (Ed.), *Critical links: Learning the arts and student achievement and social development*. Washington, DC: Arts Education Partnership.
- Tishman, S., & Palmer, P. (2006). *Artful thinking: Stronger thinking and learning through the power of art: Final report submitted to Traverse City area public schools*. Retrieved May 12, 2009, from Harvard Graduate School of Education Web site: <http://www.pz.harvard.edu/research/ArtfulThinkingFinalReport.pdf>
- Tishman, S., & Perkins, D. (1997). The language of thinking. *Phi Delta Kappan*, 78(5), 368-374.
- Tomlinson, C., & McTighe, J. (2007). *Integrating differentiated instruction + understanding by design: Connecting content and kids*. Alexandria, VA: Association for Supervision and Curriculum Development.
- Tsui, L. (2002). Fostering critical thinking through effective pedagogy: Evidence from four institutional case studies. *The Journal of Higher Education*, 73(6), 740-763.
- Twining, P., Craft, A., & Chappell, K. (2007, January 8). *Learners reconceptualising education: Widening participation through creative engagement*. Paper presented at 2007 University of Wales Institute Conference: Creativity or Conformity? Building Cultures of Creativity in Higher Education, Cardiff, Wales, UK. Abstract retrieved June 25, 2010, from <http://www.creativityconference07.org/abstracts.php>
- U.S. Department of Labor (1991). The Secretary's Commission on Achieving Necessary Skills. *What work requires of schools: A SCANS report for America*. Retrieved August 29, 2009, from <http://wdr.doleta.gov/SCANS>
- Vaughn, K., & Winner, E. (2002). SAT scores of students who study the arts: What we can and cannot conclude about the association. In R. Deasy (Ed.), *Critical links: Learning in the arts and student academic and social development* (pp. 96-97). Washington, D.C.: Arts Education Partnership.
- Vygotsky, L. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.
- Wagner, R., & Sternberg, R. (1986). Tacit knowledge and intelligence in the everyday world. In R. J. Sternberg & R. K. Wagner (Eds.), *Practical intelligence: Nature*

- and origins of competence in the everyday world* (pp. 51-83). Cambridge: Cambridge University Press.
- Walker, S. (2001). *Teaching meaning in artmaking*. Worcester, MA: Davis Publications.
- Walvoord, B., & Anderson, V. (1998). *Effective grading*. San Francisco: Jossey-Bass.
- Wandell, B., Dougherty, R., Ben-shachar, M., Deutsch, G., & Tsang, J. (2008). Training in the arts, reading, and brain imaging. In C. Asbury & B. Rich (Eds.), *Learning, Arts, and the Brain: The Dana Consortium Report on Arts and Cognition* (pp. 51-60). New York: Dana Press.
- Webb, N. (2005). *Webb alignment tool*. University of Wisconsin-Madison: Wisconsin Center of Educational Research. Retrieved November 12, 2009, from the University of Wisconsin, Wisconsin Center of Education Research Web site: <http://www.wcer.wisc.edu/WAT/index.aspx>
- Weisberg, R. (1992). *Creativity: Beyond the myth of genius*. New York: Freeman.
- Weisberg, R. (1999). *Creativity and knowledge: A challenge to theories*. In R. Sternberg (Ed.), *The handbook of creativity*. Cambridge, UK: Cambridge University Press.
- Wiggins, G. (1993). *Assessing student performance*. San Francisco: Jossey-Bass Publishers.
- Wiggins, G., & McTighe, J. (2005). *Understanding by design* (2<sup>nd</sup> ed.). Alexandria, VA: Association for Supervision and Curriculum Development.
- Winner, E., & Hetland, L. (Eds.). (2000a). *Beyond the soundbite: Arts education and academic outcomes*. Los Angeles: J. Paul Getty Trust, 117-124.
- Winner, E., & Hetland, L. (2000b). The arts and academic achievement: What the evidence shows. Double issue of *Journal of Aesthetic Education*, 34(3-4).
- Winner, E., & Simmons, S. (Eds.) (1992). *Arts PROPEL: A handbook for visual arts*. Cambridge, MA: Project Zero at the Harvard Graduate School of Education and Educational Testing Service.
- Wolfe, P. (2001). *Brain matters: Translating research into classroom practice*. Alexandria, VA: Association for Supervision and Curriculum Development.
- Zemelman, S., Daniels, H., & Hyde, A. (2005). *Best practice : New standards for teaching and learning in America's schools* (3<sup>rd</sup> ed.). Heinemann: Portsmouth, NH.

Zimmerman, B., Bandura, A., & Martinez-Pons, M. (1992). Self-motivation for academic attainment: The role of self-efficacy beliefs and personal goal setting. *American Educational Research Journal*, 29(3), 663-676.

## Appendix A

### Consent Letters

#### Informed Consent Form for Participation in Classroom Research

An Exploratory Comparative Study of Thinking in Arts Classrooms

Your child is invited to participate in a study which seeks to provide valuable information regarding how arts instruction benefits students' thinking skills and dispositions. It also investigates students' perceptions about their learning in arts classrooms during the teaching and learning process. The study is being conducted by Delane Ingalls Vanada (719-237-1416; delane.vanada@du.edu) to fulfill requirements of the Educational Administration doctoral program of the University of Denver. This study is supervised by Dr. Kent Seidel, Chair of the doctoral program (kent.seidel@du.edu).

Participation in this study should take about 85 minutes of your child's time in the coming semester. Participation will involve taking a 20-question survey and two multiple choice/open-response tests. The researcher will observe the students and teachers during instruction and student art making, as well as portfolios/sketchbooks, final products, and presentations at the end of the semester. Researcher observations of the whole class will not disrupt the regular class routine.

Your child's participation is strictly voluntary. There are no known risks or discomforts associated with this project. If, however, your child experiences discomfort, they may discontinue their participation at any time. We respect your child's right to choose not to answer any questions which may make them feel uncomfortable. A choice to not participate or withdraw from participation will not affect your child's grade or standing in the class, and his/her teacher will offer an appropriate, alternative activity.

Your child's responses will be kept under locked file, identified by code number only, and will be kept separate from information that could identify them. No names will be recorded; this is done to protect the confidentiality of your child's responses. Only the researcher will have access to your child's individual data, and any reports generated as a result of this study will use only group averages and will be used only for the intended purpose of this research. However, should any information contained in this study be the subject of a court order or lawful subpoena, the University of Denver may not be able to avoid compliance. Although no part of the student survey or tests address it, we are required by law to tell you that if information is revealed concerning suicide, homicide, or child abuse and neglect, it is required by law that this be reported to the proper authorities.

Research associated with the University of Denver that involves human participants is overseen by the Institutional Review Board. Questions or problems regarding your rights as a participant should be addressed to Susan Sadler, Chair, Institutional Review Board for the Protection of Human Subjects, at 303-871-3454, or Sylk Sotto-Santiago, Office of Research and Sponsored Programs at 303-871-4052 or write to either at the University of Denver, Office of Research and Sponsored Programs, 2199 S. University Blvd., Denver, CO 80208-2121.

If you do not understand any part of the above statements, please ask the researcher any questions you have. You may keep this page for your records. **Please complete and sign the next page indicating that you understand and if you agree or disagree to your child's participation.** In either case, please return the form to \_\_\_\_\_ by \_\_{date}\_\_\_\_, 2009. Thank you!

#### Informed Consent Form for Participation in Classroom Research

I have read and understood the foregoing descriptions of the study called "An Exploratory Comparative Study of Thinking in Arts Classrooms." If there is anything in the description that I did not understand, I have asked for and received a satisfactory explanation. I understand that I may withdraw my consent at any time. I have received a copy of this consent form.

I have checked below to indicate whether I agree or disagree to my child's participation. I have signed and dated below to indicate my consent for my child to be a part of this study.

- I agree to let my child participate.  
 I do not agree to let my child participate.

\_\_\_\_\_  
Students' Name

\_\_\_\_\_  
Signature of Parent/Guardian (Date)

(Note: Keep the former information page for yourself, and in either case, please return this form to \_\_\_\_\_ by \_\_{date}\_\_\_\_, 2009.

## Teacher Consent Letter

### **Informed Consent Form for Participation in Classroom Research for Teachers**

An Exploratory Comparative Study of Thinking in Arts Classrooms

Your classroom has been selected to participate in a study regarding students' thinking in art classrooms. Assessments and observations are designed to investigate students' critical, creative, and practical thinking skills and dispositions in the arts. It also investigates art students' perceptions about their learning in art class. The study is being conducted by Delane Ingalls Vanada (719-237-1416; delane.vanada@du.edu) of the University of Denver.

The impact to student class time is about 1 ¼ hours over the course of a semester in your art class. Students will take a 20-question survey and two multiple choice/open-response tests administered by the researcher. The researcher will collaborate with you to provide an alternative activity for students who choose not to participate, if any, and will also work with administration to reserve an appropriate alternative classroom for those students. The timing for these assessments will be arranged based on your schedule.

The impact to your time involves completing 2 rating scales concerning students' practical thinking skills and their creative dispositions. These can be done on your own time during the semester, and you will receive instruction on the rating scales. The researcher will also observe your classroom on two occasions—1) during instruction and student art making, and 2) end-of-semester presentations/projects (including portfolios/sketchbooks). These observations are not intended to disrupt your planned class routine.

The risks associated with this project are minimal. If, however, you experience discomfort you may discontinue participation at any time. I respect your right to choose not to answer any questions that may make you feel uncomfortable. Refusal to participate or withdrawal from participation will involve no penalty or loss of benefits to which you are otherwise entitled.

All collected data will be kept under locked file and identified by code number only. No names will be recorded to protect the confidentiality of student and teacher responses. Only the researcher will have access to individual data and any reports generated as a result of this study will use only group averages and will be used only for the intended purpose of this research, unless otherwise required by law. The data that will be reported will hold no bearing on the teacher's evaluations or any other purpose than the intended research.

Research associated with the University of Denver that involves human participants is overseen by the Institutional Review Board. Questions or problems regarding your rights as a participant should be addressed to Susan Sadler, Chair, Institutional Review Board for the Protection of Human Subjects, at 303-871-3454, or Sylk Sotto-Santiago, Office of Research and Sponsored Programs at 303-871-4052 or write to either at the University of Denver, Office of Research and Sponsored Programs, 2199 S. University Blvd., Denver, CO 80208-2121.

You may keep this page for your records. **Please complete and sign the next page indicating that you understand and if you agree or disagree to your participation.**

Thank you!,  
Delane Ingalls Vanada

### **Informed Consent Form for Participation in Classroom Research**

I have read and understood the foregoing descriptions of the study called "An Exploratory Comparative Study of Thinking in Arts Classrooms." If there is anything in the description that I did not understand, I have asked for and received a satisfactory explanation. I have received a copy of this consent form.

I have signed and dated below to indicate my consent to participate in this study.

\_\_\_\_\_  
Teacher's Name

\_\_\_\_\_  
Signature

\_\_\_\_\_  
(Date)

## Appendix B

### Middle School Visual Arts Teacher Survey

Thank you for taking a few minutes to fill out this 18-question survey regarding curriculum and student thinking in your art classroom. Your answers are necessary to a PhD dissertation research project; feel free to write in explanations, reactions, or your comments on anything that is unclear to you. All answers and your identity will be kept confidential. Your participation is valued and appreciated! Thank you!

1. What type of art class/classes do you teach? (Please indicate if they are year-long or semester-long classes)

2. To what degree does your curriculum (“scope and sequence”) for the classes you teach include goals for students’ thinking in the process of art making?

- |  |                                   |  |                                     |
|--|-----------------------------------|--|-------------------------------------|
| <input type="radio"/>                            | <input type="radio"/>             | <input type="radio"/>                  | <input type="radio"/>               |
| Objectives do not usually include thinking goals | I create thinking goals sometimes | I have thinking goals for most classes | Every class includes thinking goals |

3. To what degree do students employ “mind tools” (mind-mapping or “webbing” of ideas) to foster deeper thinking about ideas that connect to their art?

- |                                |   |   |   |
|--------------------------------|---|---|---|
| <input type="radio"/>          | <input type="radio"/>                       | <input type="radio"/>                       | <input type="radio"/>                                 |
| Students do not use mind tools | Students have used mind tools once or twice | Students have used mind tools several times | Students use mind tools in nearly every class I teach |

4. To what extent do your students make connections to other areas of learning (history, science, math, literature, music, etc.)?

- |                       |                       |                       |                       |
|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Never                 | Sometimes             | Often                 | Very often            |

5. To what extent does your classroom foster a “culture of inquiry” in your classroom (students investigate meaningful issues and often talk with the teacher/class about those ideas)?

- |  |  |  |  |
|--|--|--|--|
| <input type="radio"/>                        | <input type="radio"/>                                | <input type="radio"/>  | <input type="radio"/>  |
| Critical issues are not allowed at my school | Critical issues are rarely discussed in my classroom | Critical issues are sometimes discussed or a part of student artwork | Critical issues are often discussed or a part of student artwork |

6. To what extent do you employ student choice in art projects?

- |  |                                |                       |                        |
|--|--------------------------------|-----------------------|------------------------|
| <input type="radio"/>                      | <input type="radio"/>          | <input type="radio"/> | <input type="radio"/>  |
| Dictated by curriculum or teacher-directed | Students choose once in awhile | Students often choose | Students always choose |

7. To what extent are students involved in setting their own learning goals in your classroom?

- |  |                                   |                                    |  |
|--|-----------------------------------|------------------------------------|--|
| <input type="radio"/>                                | <input type="radio"/>             | <input type="radio"/>              | <input type="radio"/>                                |
| Students do not set their own goals for art projects | Students set goals once in awhile | Students often set their own goals | Students always set their own goals for art projects |

8. How often do students assess or “grade” their own processes or skills in your classroom?
- 
- Students rarely, if ever, self-assess their progress      Students self-assess once in awhile      Students often self-assess their progress      Students always self-assess and/or monitor their own progress
9. To what extent is student artwork assessed based on the process in your class?
- 
- The process is not assessed      The process is rarely assessed      The process is often assessed      The process is always assessed
10. To what extent are students responsible for the planning and organization of their art projects?
- 
- Students do not plan or organize their art projects      Students sometimes plan and organize their projects      Students often plan and organize their art projects      Students are always responsible for planning and organizing their art projects
11. To what degree do students investigate “big ideas” (concepts that provoke meaningful thinking or ideas of personal or cultural meaning) in their artwork?
- 
- Students do not link big ideas to their artwork      Students sometimes investigate big ideas      Students often investigate big ideas      Students are required to investigate big ideas associated with their artwork
12. To what degree is your classroom or school a “culture of thinking” (students are involved in reflection, in thinking about their thinking, in improving their thinking)?
- 
- A culture of thinking is not the highest priority      Once in awhile, good thinking is made a priority in my class      Good thinking is often a priority in my class      Creating an environment that fosters good thinking is a very high priority
13. To what degree do students in your classroom reflect on their art making processes or their own thinking (writing or speaking)?
- 
- Students mostly think about a quality art product and skill building      Students seldom reflect on their art processes or their thinking      Students sometimes reflect on their art making or thinking      Students often reflect on their art making or thinking
14. To what extent do students in your class link art projects to personal concerns (their own ideas, dreams, goals) or concerns regarding others in the world?
- 
- Students do not link artwork to ideas that personally concern themselves or others      Students rarely investigate personal/other concerns      Students sometimes investigate personal/other concerns      Students are required to investigate ideas that personally concern themselves or others
15. To what degree do you employ questioning (asking open-ended questions not necessarily seeking a “correct” answer, using Socratic Method or other forms of inquiry) in your art classroom?
- 
- No method of inquiry is ever      An inquiry method is      An inquiry method is      An inquiry method is used

| used   | sometimes used  | often used  | nearly 100% of the time  |
|--|---|---|--|
| 16. To what extent do students (or yourself) create visible demonstrations of student learning at the end of a unit of study (presentation boards, Power Points ©, portfolios, sketchbooks, minibooks, research papers, etc.)? |   |   |  |
| <input type="radio"/>  | <input type="radio"/>   | <input type="radio"/>   | <input type="radio"/>  |
| Final presentations are never used   | Final presentations are rarely used                                 | Final presentations are sometimes used                                | Final presentations are always used in my class                          |
| 17. To what degree do you notice that art students in your classroom use art to think from opposing points of view?  |   |   |  |
| <input type="radio"/>  | <input type="radio"/>   | <input type="radio"/>   | <input type="radio"/>  |
| Art students rarely show that they think from other vantage points   | Once in awhile students in my class think from other points of view | Art students sometimes show that they think from other vantage points | Art students often show their ability to think from other points of view |
| 18. To what extent does your curriculum focus on teaching students how to think more creatively?   |   |   |  |
| <input type="radio"/>  | <input type="radio"/>   | <input type="radio"/>   | <input type="radio"/>  |
| The skill for creative thinking automatically happens in art   | There is a focus on creative thinking skills once in awhile         | Creative thinking skills are sometimes stressed                       | There is a strong emphasis on creative thinking skills                   |

Please share any additional comments here:

Based on this survey, a few classrooms will be chosen to be in a one-semester research project. The project involves student thinking skills and dispositions in arts classrooms. If your classroom is chosen, would you be willing to be contacted by the researcher about being involved? If your classroom is chosen and you are interested in being involved, I will arrange to visit your classroom to observe and to discuss the details of the study. Your participation is entirely voluntary.

- I am willing to be contacted and interested in being involved in the study.  
 I am not willing to be contacted

If you agree to be contacted, please provide the following information and return this survey to the email address below. Thank you!

NAME \_\_\_\_\_ School \_\_\_\_\_

School Address \_\_\_\_\_ City \_\_\_\_\_

Zip code \_\_\_\_\_ School Phone \_\_\_\_\_ Phone \_\_\_\_\_

Email \_\_\_\_\_



## Appendix C

### Follow-up Observation: Assessing for Learner-Centeredness

Based on observations/reflections of a class, an examination of a unit, or a review of a task; rate each item below on a scale from 0= not evident; 1 = not very apparent, to 3 = strongly evident. Support your rating.

|                                     | Criteria   | Rating<br>0- 1- 2- 3 | Explanation/Reflection<br><i>(see notes)</i>             |
|-------------------------------------|--|----------------------|--|
| <b>Connection-making</b>            | 1. The work students are doing is connected to “big ideas” or issues of personal or global significance to humanity as connected to art.   |                      | <i>(Capitalize on arts’ power for connection-making)</i> |
|                                     | 2. Students have opportunities to make connection within & between content areas. Interdisciplinary thinking is evident.   |                      |  |
|                                     | 3. Teachers or students make connections to prior learning, student experiences, or ideas (Bransford et al., 2000)   |                      |  |
| <b>Engagement / Self-Direction</b>  | 4. Students participate in managing their own learning (planning, self-assess, goal-setting, etc.)   |                      | <i>(Learning goals?)<br/>(Self assessment?)</i>          |
|                                     | 5. Students are involved in tasks that capture their attention and interest. Work is engaging (intellectually, socially, or personally) meaningful, worthwhile & has purpose.    |                      |  |
|                                     | 6. Some degree of meaningful choice & independence/ autonomy allows students’ personal ownership of the work.  |                      | <i>(vs. lessons dictated by teacher)</i>                 |
| <b>Inquiry-based processes</b>      | 7. Students’ thinking is made visible through in-depth work: discussion, sharing, reflection, demonstration of understanding.  |                      | <i>(Critiques? Journals?)<br/>(Thinking assessed?)</i>   |
|                                     | 8. Students are held responsible for using good thinking (Resnick, 2000). Adequate time given for investigating, reflecting, reasoning, & expression. Evidence of metacognition. |                      | <i>(Thinking valued?)</i>                                |
|                                     | 9. There is an emphasis on curiosity, inquiry, investigating, etc. Questioning is an apparent part of artmaking.   |                      |  |
| <b>Depth of Work/ High Thinking</b> | 10. The work is challenging/rigorous for students (pushing their thinking in new directions or reexamining their ideas). Effort and hard work are recognized.                    |                      |  |
|                                     | 11. Student work (process and product) is held to a standard in quality and content.   |                      | <i>(see rubric used)</i>                                 |
|                                     | 12. Deep vs. Superficial coverage of topics. Complex thinking goes beyond skill building to problem solving, explaining choices, synthesizing creative + critical.               |                      | <i>(Reasoning w/ evidence?)</i>                          |
| <b>Content Focus /Balance</b>       | 13. Originality & creativity is balanced with quality & craftsmanship for real-world learning (Resnick & Hall, 2000)   |                      | <i>(Authentic tasks?)</i>                                |
|                                     | 14. Curriculum and student activity involves a balance of critical, creative, and practical thinking.  |                      | <i>(Focus on thinking?)</i>                              |
|                                     | 15. Evidence of constructivism (knowledge construction) vs. “top down” / “cookie cutter” lessons. The process is valued.   |                      | <i>(Active or Passive?)<br/>(process vs. product)</i>    |

References: Ritchhart et al. (2003); Resnick & Hall (2000); Webb (2005); Zemelman et al. (2005).

#### Value-added points:

\_\_\_\_ (3 pts. possible) Informal, same-day teacher “interview” of teacher’s perceptions (“Tell me more about \_\_\_\_\_ in your class” or “Tell me about some of your goals for...”):

1. connection-making (personal, within and between subjects; use of “big ideas”
2. student self-direction (responsible for planning, goal-setting, planning, organizing, choosing, assessing)
3. putting focus on students’ thinking through inquiry
4. balance of thinking: creative, critical, practical (or design thinking)
5. active vs. passive learning (valuing the process; constructivist vs. “top down”)

\_\_\_\_ (3 pts. possible) Evidence noted from Rubric/process assessment (vs. product only):

\_\_\_\_ (3 pts. Possible) Teacher’s written objectives for the course (also expressed to students)

\_\_\_\_ TOTAL POINTS (54 pts. possible)

## Appendix D

### Critical Thinking Skills Assessment (CTS)

Thank you for taking this quiz. It is important to this research to know about your critical thinking skills. Please be honest; no one sees your answers but the researcher. Your score does not affect your grade in this class. Thank you for doing your best!

#### SAMPLE Question 1:

*Teasing is a problem at Brighton Middle School. Students tease each other and sometimes the teachers also tease the students. A teacher decided to take a survey to get students' ideas and learn more about their experiences. 6<sup>th</sup> - 8<sup>th</sup> students took the survey. The survey showed that:*

- 5% thought teasing was not a problem (95% thought that teasing was bad).
- 6<sup>th</sup> graders saw teasing as "cruel" twice as often as did eighth graders.
- Older students were more forgiving of teachers who tease students, but younger students did not like it when teachers teased their classmates.

- 1a. Which of the following statements best summarizes **what the middle school teacher found out** about teasing?
- Older students like being teased
  - The students thought that teasing is a friendly, joking way to have fun
  - The students at Brighton are sensitive about being teased, especially the younger students
  - The survey was only given to small groups of students so teasing can't be a problem

#### Question 2:

2. This is a "still" - a single frame - from an animation by artist William Kentridge. From looking at this frame, pick which choice you feel best tells what is happening in the story:



- The person is driving a car and is excited to be going to pick his daughter up at school
- The man in the picture is thinking about something happy that happened
- The man in the mirror is thinking about something that he troubled about
- The person is angry

2b. Explain what you see that made you choose the sentence that you picked:

---

---

---

#### Question 3:

*It has been said that, "Art is a reflection of the time period and the culture in which it was made."*

3. The artwork on the right is by and American artist named Barbara Kruger.

Pick the statement that **best** tells what else the artist might be saying about American culture:

- People like to hold little cards in their hands
- This person likes to advertise about shopping
- Shopping makes people feel important
- Americans like to shop



[Kruger, B. (1987). *Untitled (I shop, therefore I am)*. [Photographic silkscreen on vinyl]. Retrieved from pbs.org]

#### Question 4:

*Gateway Middle School teachers did a survey of sources of stress in their students' lives. The survey showed that student stress was caused by two general sources: school and home. School stress came from too*

much pressure about grades, too much homework (especially in math), “picky rules,” and overly judgmental friends. Sources of stress at home came from disagreements with parents.

4a. What do you think is the main problem in this story?

\_\_\_\_\_

4b. Give **one reason why** you say that:

\_\_\_\_\_

4c. We need a solution to students’ stress. Based on the story, rate the following ideas on **how important they are to solving the problem** (3 is the best choice and 0 is the worst). **Circle your answer.**

- c. The teachers should do more to help their students to see that they are stressed and to deal with their stress.
- |              |   |                   |   |               |   |                     |
|--------------|---|-------------------|---|---------------|---|---------------------|
| 0            | - | 1                 | - | 2             | - | 3                   |
| A bad choice |   | Just an OK choice |   | a good choice |   | an excellent choice |
- d. All teachers should assign less homework so students won’t be so stressed.
- |              |   |                   |   |               |   |                     |
|--------------|---|-------------------|---|---------------|---|---------------------|
| 0            | - | 1                 | - | 2             | - | 3                   |
| A bad choice |   | Just an OK choice |   | a good choice |   | an excellent choice |
- e. The school could interview students about what school rules are too “picky.”
- |              |   |                   |   |               |   |                     |
|--------------|---|-------------------|---|---------------|---|---------------------|
| 0            | - | 1                 | - | 2             | - | 3                   |
| A bad choice |   | Just an OK choice |   | a good choice |   | an excellent choice |

**Question 5:**

*At the beginning of the school year, Isaac did not believe he was a good artist. He did not see any purpose in creating art. He just wanted to play music, and he did not like the art teacher’s ideas. **By the end of the year, Isaac had changed his mind.** He did a group project with Ben and Shyla. The group project was a 10-foot tall sculpture about music that was made out of metal parts.*

List **2 clues** as to what might have caused Isaac to change his mind about the art class.

- a. \_\_\_\_\_
- b. \_\_\_\_\_
- c. What is the main thing that might have caused Isaac to change his mind about art?  
\_\_\_\_\_
- d. Explain your reason(s) for your choice:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Question 6:**

6 a. Look at the photograph by Dorthea Lange. Pick the caption below that you feel best describes what is happening in the photograph:

- a. this man is sitting against a blank wall and looks happy
- b. the photographer made this person look alone and sad
- c. the photographer made this person look hopeful that something better will come along
- d. the wheelbarrow is upside down because the wind just blew it over



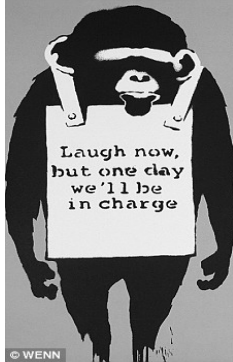
6b. Give a possible explanation for what is happening in this photograph:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Question 7:**

Banksy is probably the most popular, yet most mysterious, urban street artist in the world. Banksy has become known all over the world for his activist graffiti on public surfaces — walls, buildings, and sidewalks. Yet, he has kept his identity a secret. His artwork questions issues in culture such as war and politics. To some he is known as a prankster or a vandal, to some he is a genius. He has been known to sneak his artwork into famous museums. Each piece of Banksy’s artwork sells for over half a million dollars and is owned by Hollywood celebrities such as Brad Pitt, Angelina Jolie and Christina Aguilera.

*Pretend that Banksy has been taken to*



*to jail. You have been given the power to decide whether Banksy should be charged as a criminal or set free as a*



*genius artist. What are the most important issues that you must consider*

*to make this decision?*

Banksy. (Undated). Untitled. <http://artwelove.com>

*Circle your answer for how important each of the following issues is to making your decision:*

- a. Banksy’s artwork is owned by famous people.
 

|                                |   |                    |   |           |   |           |
|--------------------------------|---|--------------------|---|-----------|---|-----------|
| 0                              | - | 1                  | - | 2         | - | 3         |
| Not important at all important |   | somewhat important |   | important |   | extremely |
  
- b. Banksy takes risks in making artistic statements about difficult issues in society.
 

|                                |   |                    |   |           |   |           |
|--------------------------------|---|--------------------|---|-----------|---|-----------|
| 0                              | - | 1                  | - | 2         | - | 3         |
| Not important at all important |   | somewhat important |   | important |   | extremely |
  
- c. Banksy’s artwork sells for tens of thousands of dollars.
 

|                                |   |                    |   |           |   |           |
|--------------------------------|---|--------------------|---|-----------|---|-----------|
| 0                              | - | 1                  | - | 2         | - | 3         |
| Not important at all important |   | somewhat important |   | important |   | extremely |
  
- d. Banksy’s artwork is very creative, but he is breaking the law by painting on public buildings.
 

|                                |   |                    |   |           |   |           |
|--------------------------------|---|--------------------|---|-----------|---|-----------|
| 0                              | - | 1                  | - | 2         | - | 3         |
| Not important at all important |   | somewhat important |   | important |   | extremely |

**Question 8:**

*CJ had always liked to draw, make things, and create computer graphics ... until he got in Mr. Vince’s art class. Mr. Vince wanted all the students to make art projects that looked exactly like the master artists they were studying in class. Since then, CJ has started to lose interest in art and has been goofing off in class and bothering other students while they were working. He told a friend that he now hates art.*

8a. Write what you think would be a **good** ending to this story:

---



---



---

8b. Explain why you think this would be a good ending:

---



---



---

8c-e. Rate the following choices that CJ might have in this situation (0 is a bad choice, 3 is an excellent choice): Circle your answer.

- c. CJ could drop out of the art class and never go back to doing art again
- 0                      1                      2                      3
- A bad choice                      Just an OK choice                      a good choice                      an excellent choice
- f. CJ could show interest in what Mr. Vince is teaching and try to talk to Mr. Vince about his other interests in art
- 0                      1                      2                      3
- A bad choice                      Just an OK choice                      a good choice                      an excellent choice
- g. CJ could keep goofing off in class and get in trouble again
- 0                      1                      2                      3
- A bad choice                      Just an OK choice                      a good choice                      an excellent choice

Artworks not referenced for test-takers:

Kentridge, W. (1996). *History of the main complaint* [Video with sound]. Retrieved from <http://www.learningthrouart.org>

Lange, D. (1934). *Man beside wheelbarrow*. [Gelatin silver print]. Retrieved from [http://museumca.org/picturethis/3\\_1.html](http://museumca.org/picturethis/3_1.html)

## Critical Thinking Skills Assessment

### Teacher information and answer key:

|   |
|---|
| [Sample Question 1: Ethical dilemma, problem finding, probability inference]- not graded                        |
| Question 2: Inference, deduction, reasoning with evidence   |
| Question 3: verbal reasoning, inference   |
| Question 4: Problem identification, Likelihood & certainty (probability), reasoning with evidence               |
| Question 5: problemsolving/exploring alternatives, generating possibility (hypothesis), reasoning with evidence |
| Question 6: Inference, Deductive thinking, generating possibility (hypothesis), reasoning with evidence         |
| Question 7: expose bias, argument analysis, judgment, ethics  |
| Question 8: Likelihood, certainty (can one know for certain?); generating possibility (hypothesis)              |

#### When introducing this assessment to students, the researcher will say:

*"This assessment uses a type of your thinking called critical thinking. The questions will ask you to do things like make the best choice, give reasons for your choices, identify problems, solve problems, etc. Just circle or write in the answer that you think will best answer the question. Good luck"*

#### Rationale for Grading procedure:

For greater consistency among the matrix of assessments, both multiple choice and open response items are on a 0-1-2-3 scale. Test items which that are problem identification questions (#4a, 8a), scoring is done by a 0 for incorrect or 3 for correct. *Note: Answers that require "reasoning with evidence" may receive full credit, if well defended. Answers that are clearly made due to a difference of beliefs (as clear in the written evidence portion) may receive full credit (see Ennis, 1993; Halpern, 2004)*

#### Depth Scale Rubric for Evidence

| 0                     | 1 (Weak)   | 2 (Moderate)  | 3 (Fairly strong or Strong)   |
|-----------------------|--|---|---|
| -No attempt to answer | -Attempts to support assertions, observations, or opinions; BUT evidence is based in personal opinion or speculation rather than in the object, idea, picture, or situation; OR evidence is based in the object, idea, or situation, but only provides | -Object, idea, or situation are mentioned but support is weak.<br><br>-Attempts to show how they arrived at a conclusion<br><br>-Support is reasonable but not grounded by specific cues from | -Displays strong ability to reason with evidence.<br><br>-Supports assertions, observations, or opinions with specific information and/or cues from the object, idea, picture, or situation; <b>AND provides clear, specific,</b> |

|  |   |  |  |
|--|---|--|--|
|  | vague, unclear, or unreasonable support for assertions.<br><br>- Evidence is based on circular logic. There is no attempt to express how student arrived at a conclusion or is unclear about how arrived at a conclusion. | the object, idea, picture, or situation<br>-May show personal speculation together with some specific evidence from the object, picture, idea, or situation. | <b>and reasonable support for assertions.</b><br><br>-Evidence may be based in personal speculation but must use specific cues from the object, idea, or situation. There may be an attempt to express <b>how student arrived at a conclusion.</b> |
|--|---|--|--|

Note: Adapted from Isabella Gardner Museum research (Adams et al. 2007) and Housen & Yenawine (2000)

| Questions                    |  | Possible Answers  | Poss. Pts                |                                     |                         |                          |   |
|------------------------------|--|---|--------------------------|-------------------------------------|-------------------------|--------------------------|---|
| 2:                           | a.0 b.1 c.3 d.2                                    |   | 3                        |                                     |                         |                          |   |
| 2b.                          | Open response reasoning (see rubric)               | For 3 pts., “the way eyebrows are shaped,” “eyebrows have concerned look” or “are sort of puckered in between,” or eyes “show no spark of happiness” (vs. happiness and excitement)   | 3                        |                                     |                         |                          |   |
| 3.                           | a.0 b.1 c.3 d.2                                    |   | 3                        |                                     |                         |                          |   |
| 4a.                          | Open problem identific. (see rubric)               | For 3 pts.: “stress” or “sources of student stress” or similar answers  | 0 or 3                   |                                     |                         |                          |   |
| 4b.                          | Open response reasoning with evidence (see rubric) | For 3 pts., students may LIST some of the sources in the story ( <i>pressure about grades, too much homework (especially in math), “picky rules,” and overly judgmental friends, disagreements with parents</i> ); refer to evidence in the story.  | 3                        |                                     |                         |                          |   |
| 4c                           | 0=0; 1=1; 2=2; 3=3                                 |   | 3                        |                                     |                         |                          |   |
| 4d.                          | 0=0; 1=2; 2=3; 3=1                                 | (Answer 2=3; perhaps not all teachers need to assign less homework. We are just told that the math teachers assign too much).   | 3                        |                                     |                         |                          |   |
| 4e.                          | 0=0; 1=1; 2=2; 3=3                                 | (Answer 3=3; interviewing about picky rules helps school understand which of their rules are that way & stress out students)  | 3                        |                                     |                         |                          |   |
| 5a. & 5b.                    | Open problem identific. (see rubric)               | <table border="1" style="display: inline-table; vertical-align: top;"> <tr> <td>0-no answer</td> <td>1-answer is given but is not viable</td> <td>2- one answer is viable</td> <td>3-2 viable answers given</td> </tr> </table><br>Possible Answers: “used his interest in music in art; did a group project; liked sculpture or working with his hands/building things/working with metal; making a 10 ft. tall sculpture” | 0-no answer              | 1-answer is given but is not viable | 2- one answer is viable | 3-2 viable answers given | 3 |
| 0-no answer                  | 1-answer is given but is not viable                | 2- one answer is viable   | 3-2 viable answers given |                                     |                         |                          |   |
| 5c.                          | Open response reasoning with evidence (see rubric) | For 3 pts.: “integrating music/art”; “make a sculpture about things he likes,” “he created art about an important subject in his life”.   | 3                        |                                     |                         |                          |   |
| 5d.                          | Open response reasoning with evidence (see rubric) | For 3 pts.: Student supports reason with information from paragraph (i.e.”because the story said he liked music; “changed his mind because he incorporated music with his art”  | 3                        |                                     |                         |                          |   |
| 6a.                          | A=1; b=3; c=0; d=2                                 |   | 3                        |                                     |                         |                          |   |
| 6b.                          | Open response reasoning with evidence (see rubric) | For 3 pts.: Student adds specific info/cues from picture with possibilities/hypothesis: “head is down”; “it looks like the wheelbarrow is all he’s got”; “wheelbarrow is upside down with nothing in it”; “shoulders are slumped”   | 3                        |                                     |                         |                          |   |
| 7a.                          | 0=3; 1=2; 2=1; 3=0                                 |   | 3                        |                                     |                         |                          |   |
| 7b.                          | 0=0; 1=1; 2=2; 3=3                                 |   | 3                        |                                     |                         |                          |   |
| 7c.                          | 0=3; 1=2; 2=1; 3=0                                 |   | 3                        |                                     |                         |                          |   |
| 7d.                          | 0=0; 1=1; 2=2; 3=3                                 |   | 3                        |                                     |                         |                          |   |
| 8a.                          | Open problem identific. (see rubric)               | For 3 pts.: Good endings are grounded in wise action: CJ could stop goofing off, start liking Mr. vince, try to talk to Mr. Vince, find ways to make it interesting   | 0 or 3                   |                                     |                         |                          |   |
| 8b.                          | Open response reasoning with evidence (see rubric) | For 3 pts.: Student attempts to express how they arrived at a conclusion. Uses evidence from the story to defend their “good ending”.   | 3                        |                                     |                         |                          |   |
| 8c.                          | 0=3; 1=2; 2=1; 3=0                                 |   | 3                        |                                     |                         |                          |   |
| 8d.                          | 0=0; 1=2; 2=3; 3=3                                 | (This is an ambiguous situation, with no real right or wrong answers, students who choose 2 or 3 are given 3 points)  | 3                        |                                     |                         |                          |   |
| 8e.                          | 0=3; 1=2; 2=1; 3=0                                 |   | 3                        |                                     |                         |                          |   |
| <b>TOTAL POSSIBLE POINTS</b> |  |   | <b>66</b>                |                                     |                         |                          |   |

Adams, M., Foutz, S., Luke, J. & Stein, J. (2007). Summary: Thinking through art, isabella stewart gardner museum school partnership program year 3 research results. Institute for Learning Innovation: School Partnership Program.  
Housen, A. & Yenawine, P. (2000). *Visual thinking strategies curriculum. A multi-year curriculum (Grades K-2, 3-5) using art objects to teach critical and creative thinking in schools.* New York: Visual Understanding in Education.

## Appendix E

### Creative Thinking Skills Assessment Tool (CvTS)

|   |                      |              |  |                      |              |
|---|----------------------|--------------|--|----------------------|--------------|
| <b>PROCESS</b>  |                      |              |  | <b>0 – 1 – 2 – 3</b> |              |
| <b>Problem finding</b> (Getzels & Jackson, 1962)  |                      |              |  |                      |              |
| <ul style="list-style-type: none"> <li>• Evidence of <b>questioning/curiosity</b></li> <li>• Motivation to probe (look beneath the surface) for understanding or truth</li> </ul>   |                      |              |  |                      |              |
| <b>Planning</b>   |                      |              |  |                      |              |
| <ul style="list-style-type: none"> <li>• Evidence of competencies/skills in planning, forethought, goal-setting, time management, using resources (Sternberg &amp; Lubart, 1999)</li> </ul>   |                      |              |  |                      |              |
| <b>Problem solving</b>  |                      |              |  |                      |              |
| <ul style="list-style-type: none"> <li>• Critical + creative + practical skills applied in problem solving; makes unusual connections; may apply practical insight (Sternberg &amp; Lubart, 1999)</li> </ul>  |                      |              |  |                      |              |
| <b>PERCEPTUAL SKILL/ CONCEPTION</b>   |                      |              |  | <b>0 – 1 – 2 – 3</b> |              |
| <b>Meaning-making</b>   |                      |              |  |                      |              |
| <ul style="list-style-type: none"> <li>• Proficiency in communicating an idea, theme, or emotion (“expressive power”)</li> <li>• Personal or cultural meaning-making; relevance in process &amp; product (Sternberg et al., 1999)</li> </ul>                    |                      |              |  |                      |              |
| <b>Connections/ Transformation</b>  |                      |              |  |                      |              |
| <ul style="list-style-type: none"> <li>• Product represents connection-making (i.e., relates unrelated ideas or to new ideas)</li> <li>• Product represents a transformation/reorganization of ideas (Isaksen et al., 1993)</li> </ul>                          |                      |              |  |                      |              |
| <b>PRODUCTS</b>   |                      |              |  | <b>0 – 1 – 2 – 3</b> |              |
| <b>Originality/ Imagination</b>   |                      |              |  |                      |              |
| <ul style="list-style-type: none"> <li>• Shows unique, creative application of ideas (vs. conformity to “how it should look”)</li> <li>• Evidence of innovation, novelty, or individuality (Isaksen et al., 1993)</li> </ul>                                    |                      |              |  |                      |              |
| <b>Skill/ Craftsmanship</b>   |                      |              |  |                      |              |
| <ul style="list-style-type: none"> <li>• Applies artistic process and skills with knowledgeable use of media with increasing complexity and skill</li> <li>• Product has aesthetic coherence and appeal &amp;/or serves a function (Sternberg, 1998)</li> </ul> |                      |              |  |                      |              |
| <b>Complexity of Thinking</b>   |                      |              |  |                      |              |
| <ul style="list-style-type: none"> <li>• Evidence of complex, productive reasoning that has led to invention/creation OR</li> <li>• Applies self-assessment (personal goals/standards), self-correction, self-reflection</li> </ul>                             |                      |              |  |                      |              |
| <i>*Note: If criteria for products/processes or dispositions is not evident, student receives 0.</i>  |                      |              |  |                      | <b>TOTAL</b> |
| <b>Traits / Dispositions (*PICK 2)</b>  | <b>0 – 1 – 2 – 3</b> | <b>Score</b> | <b>0 – 1 – 2 – 3</b>   | <b>Score</b>         |              |
| <b>Tolerance of Ambiguity</b><br>(manages complexity; more than one right answer)   | 0 – 1 – 2 – 3        |              | <b>Intuitiveness</b> (utilizes insight) and/or perceptual alertness— (uses senses) | 0 – 1 – 2 – 3        |              |
| <b>Open-mindedness</b><br>(Gardner, 1993)   | 0 – 1 – 2 – 3        |              | <b>Fluency of ideas, creations</b><br>(multiple ideas with complexity)             | 0 – 1 – 2 – 3        |              |
| <b>TOTAL</b>  |                      |              | <b>TOTAL</b>   |                      |              |
| <b>Other Evidence (*PICK 2):</b>  |                      |              |  |                      |              |
| <b>Research Workbooks</b><br>(including sketches, written reflections, practices, photos—growth over time; problem solving, planning)   |                      |              |  | <b>0 – 1 – 2 – 3</b> |              |
| <b>Or: Portfolio</b><br>(consider evidence of originality, technicality, meaning-making, complexity in process and product) (Eisner, 2002)  |                      |              |  | <b>0 – 1 – 2 – 3</b> |              |
| <b>Sustained and Concentrated Effort</b><br>(as may be may be evident in amount of work produced, depending on complexity of pieces) (Moseley et al., 2005; Sternberg, 2009)  |                      |              |  | <b>0 – 1 – 2 – 3</b> |              |
| <b>TOTAL</b>  |                      |              |  |                      |              |

## Appendix F

| Practical Thinking Skills Assessment (PTS)  |                                       |       |           |                |
|---|---------------------------------------|-------|-----------|----------------|
| Cognitive Process Dimensions  | Frequency of Observed Thinking/Acting |       |           |                |
|   | Always                                | Often | Sometimes | Never observed |
| Communication   |                                       |       |           |                |
| <ul style="list-style-type: none"> <li>• Has strong communication and presentation skills</li> </ul>                        |                                       |       |           |                |
| <ul style="list-style-type: none"> <li>• Asks thoughtful or clarifying questions (is not afraid to do so)</li> </ul>        |                                       |       |           |                |
| Nonverbal Communication   |                                       |       |           |                |
| <ul style="list-style-type: none"> <li>• Establishes eye contact with person who is speaking</li> </ul>                     |                                       |       |           |                |
| Work Ethic and Time Management  |                                       |       |           |                |
| <ul style="list-style-type: none"> <li>• Turns in projects on time</li> </ul>   |                                       |       |           |                |
| Accountability for Decisions and Actions  |                                       |       |           |                |
| <ul style="list-style-type: none"> <li>• Accepts responsibility for mistakes/ does not blame others</li> </ul>              |                                       |       |           |                |
| Initiation  |                                       |       |           |                |
| <ul style="list-style-type: none"> <li>• Seeks adult help when needed</li> </ul>  |                                       |       |           |                |
| Organization Skills   |                                       |       |           |                |
| <ul style="list-style-type: none"> <li>• Able to keep information from various classes/assignments straight</li> </ul>      |                                       |       |           |                |
| Self-Direction  |                                       |       |           |                |
| <ul style="list-style-type: none"> <li>• Plans ahead or sets personal goals for work or life</li> </ul>                     |                                       |       |           |                |
| Relating to Others  |                                       |       |           |                |
| <ul style="list-style-type: none"> <li>• Displays good social skills; interacts well with others</li> </ul>                 |                                       |       |           |                |
| <ul style="list-style-type: none"> <li>• Expresses personal regard for and interest in others (respect)</li> </ul>          |                                       |       |           |                |
| Responsibility  |                                       |       |           |                |
| <ul style="list-style-type: none"> <li>• Takes responsibility for things they are supposed to do</li> </ul>                 |                                       |       |           |                |
| Ethical Behavior  |                                       |       |           |                |
| <ul style="list-style-type: none"> <li>• Gets needed information ethically (i.e., internet or from others)</li> </ul>       |                                       |       |           |                |
| <ul style="list-style-type: none"> <li>• Resists pressure to engage in unsafe or unethical activities</li> </ul>            |                                       |       |           |                |
| Technology Skills   |                                       |       |           |                |
| <ul style="list-style-type: none"> <li>• Uses technology at appropriate times (I.M., texting, internet)</li> </ul>          |                                       |       |           |                |
| Adapts to New Situations  |                                       |       |           |                |
| <ul style="list-style-type: none"> <li>• Adapts well to changes of middle school</li> </ul>                                 |                                       |       |           |                |
| Overall Common Sense  |                                       |       |           |                |
| <ul style="list-style-type: none"> <li>• Makes wise choices in life/relationships</li> </ul>                                |                                       |       |           |                |
| <ul style="list-style-type: none"> <li>• Displays understanding of what is safe or not safe in the art classroom</li> </ul> |                                       |       |           |                |

*Note:* This is a teacher-rated assessment (Informed by: IL State Board, 2003; Sternberg, 2001; Wagner et al., 1986)



## Appendix G

### Creative Thinking Dispositions Assessment Tool (CvTD)

*Note:* Each disposition is assigned two scores: one for strength/ robustness (how often it is observed; how strongly a student is curious) and one for complexity /sophistication of the trait (the degree to which a student is curious).

|   | <b>C-R-E-A-T-E Model of Assessing Dispositions</b>                           |                            |                            |                            |              |
|---|--|----------------------------|----------------------------|----------------------------|--------------|
|   | <b>Dimension of Strength</b> (STRENGTH AND SOPHISTICATED OF THE DISPOSITION) |                            |                            |                            |              |
| <b>Dispositions:</b>  | 0) None Observed   | 1) Sometimes observed      | 2) Often Observed          | 3) Always Observed         | <b>Score</b> |
| <b>Curiosity</b><br>(interested in the world, new ideas, connections)                   | Strength 0<br>Complexity 0   | Strength 1<br>Complexity 1 | Strength 2<br>Complexity 2 | Strength 3<br>Complexity 3 |              |
| <b>Resilience</b><br>(persistent, doesn't give up easily)                               | Strength 0<br>Complexity 0   | Strength 1<br>Complexity 1 | Strength 2<br>Complexity 2 | Strength 3<br>Complexity 3 |              |
| <b>Experimenting</b><br>(willingness to try new things, take risks; adventurous spirit) | Strength 0<br>Complexity 0   | Strength 1<br>Complexity 1 | Strength 2<br>Complexity 2 | Strength 3<br>Complexity 3 |              |
| <b>Attentiveness</b><br>(gives concentrated effort)                                     | Strength 0<br>Complexity 0   | Strength 1<br>Complexity 1 | Strength 2<br>Complexity 2 | Strength 3<br>Complexity 3 |              |
| <b>Thoughtfulness</b><br>(thinks before acting)   | Strength 0<br>Complexity 0   | Strength 1<br>Complexity 1 | Strength 2<br>Complexity 2 | Strength 3<br>Complexity 3 |              |
| <b>Open-mindedness</b><br>(vs. closed-minded; interested in others)                     | Strength 0<br>Complexity 0   | Strength 1<br>Complexity 1 | Strength 2<br>Complexity 2 | Strength 3<br>Complexity 3 |              |

Adapted from: Claxton, G. (2006). Cultivating creative mentalities: A framework for education. *Thinking Skills and Creativity*, 1, 57-61. Carr, M. & Claxton, G. (2002). Tracking the development of learning dispositions. *Assessment in Education*, 9(1), 9-37. Ritchhart, R. (2002). *Intellectual character: What it is, why it matters, and how to get it*. San Francisco: Jossey-Bass.

| <b>Traits / Dispositions</b>                            | <b>0 – 1 – 2 – 3</b>           | <b>Score</b> |   | <b>0 – 1 – 2 – 3</b>           | <b>Score</b> |
|---|--------------------------------|--------------|---|--------------------------------|--------------|
| -Tolerance of Ambiguity<br>(more than one right answer) | 0 – 1 – 2 – 3<br>0 – 1 – 2 – 3 |              | -Intuitiveness (utilizes insight)   | 0 – 1 – 2 – 3<br>0 – 1 – 2 – 3 |              |
| -Flexibility (adaptability)                             | 0 – 1 – 2 – 3<br>0 – 1 – 2 – 3 |              | -Fluency of ideas/ creations<br>(deductive reasoning)                             | 0 – 1 – 2 – 3<br>0 – 1 – 2 – 3 |              |
| -Originality (novel ideas)                              | 0 – 1 – 2 – 3<br>0 – 1 – 2 – 3 |              | -Keen awareness of senses<br>(perceptual alertness); strong<br>observation skills | 0 – 1 – 2 – 3<br>0 – 1 – 2 – 3 |              |

Adapted from Beattie, D. (2000). Creativity in art: The feasibility of assessing current conceptions in the school context. *Assessment in Education*, 7(2), 175-192.

## Appendix H

### Practical Thinking Dispositions Assessment Tool (PTD)






#### Practical Dispositions Self-Assessment

DIRECTIONS: On a scale of 0 to 4, please rate yourself in the following areas. Please be honest. Circle the number that goes with your answer.

| <b>Self-Assessment of Practical Dispositions</b>   |   |
|--|---|
|  | 0   -   1   -   2   -   3<br>Never   Sometimes   Often   Always |
| 1. Sometimes I give up when things get hard.   | 0   -   1   -   2   -   3                                       |
| 2. I am easily distracted when I am studying.  | 0   -   1   -   2   -   3                                       |
| 3. Sometimes when we are learning about something new, I notice things that other people don't notice. | 0   -   1   -   2   -   3                                       |
|  |   |
| 4. I am afraid to ask questions when I am curious about something.                                     | 0   -   1   -   2   -   3                                       |
| 5. I have creative ideas that I toss around in my mind.  | 0   -   1   -   2   -   3                                       |
| 6. When I get stuck in an art project, I can usually think of solutions or ways to get help.           | 0   -   1   -   2   -   3                                       |
|  |   |
| 7. I like to plan out ideas in my mind before I start a project.                                       | 0   -   1   -   2   -   3                                       |
| 8. I can change direction when something happens to my project.  | 0   -   1   -   2   -   3                                       |
|  |   |
| 9. It bothers me when other people don't agree with me.  | 0   -   1   -   2   -   3                                       |
| 10. I have a positive influence on my friends.   | 0   -   1   -   2   -   3                                       |

*Note:* Based on Claxton, G. (2002). *Building learning power: Helping young people become better learners*. Bristol, UK: PLO Ltd.

## Appendix I

| T- H-I-N-K Tool for Assessing Overall Quality Thinking (OQO)   |  |  |  |   |   |
|--|--|--|--|---|---|
| <p><i>(Instructions: Assign highest degree of cognitive complexity observed for each knowledge dimension below; Depth of Rigor indicates level of expectation/objectives held out to students.</i></p> <p><i>0=Not observed)</i></p> | Cognitive Process Dimensions   |  |  |   |   |
|  | Level 1:<br>Think-1pt  | Level 2:<br>Plan-1pt   | Level 3:<br>Investigate-2pts   | Level 4:<br>New Ideas-2pts  | Level 5:<br>Know -3pts  |
|  |   |   |    |    |    |
|  | <ul style="list-style-type: none"> <li>-Engage</li> <li>-Recall/ recognize</li> <li>-Basic questioning</li> <li>-Perceive &amp; define (no supporting facts required)</li> <li>-Observe</li> </ul> | <ul style="list-style-type: none"> <li>-Plan</li> <li>-Set goals</li> <li>-Organize</li> <li>-Arrange and classify information</li> <li>-Compare &amp; contrast</li> </ul> | <ul style="list-style-type: none"> <li>-Analyze (errors, ideas; pts. of view)</li> <li>-Induct/Deduct</li> <li>-Break into parts</li> <li>-Consider possibilities</li> <li>-Make connections (to self &amp; others)</li> <li>-Explore</li> </ul> | <ul style="list-style-type: none"> <li>-Create</li> <li>-Generate</li> <li>-Attach meaning to creations</li> <li>-Problem-solve</li> <li>-Share ideas</li> <li>-Instill a plan</li> <li>-Consider “why” /interpret</li> </ul> | <ul style="list-style-type: none"> <li>-Reason with evidence</li> <li>-Synthesize critical + creative (parts to form new whole)</li> <li>-Self-evaluate</li> <li>-Self-reflect</li> <li>-Elaborate understanding</li> </ul> |
| <b>Knowledge Dimensions:</b>   | <i>[Determine the alignment between level/depth of knowledge (complexity) for each knowledge dimension.]</i>   |  |  |   |   |
| <b>Factual (Critical)</b><br>List factual stds: i.e., Elements & Principles, technical quality (Ability to identify, discuss, use, apply, then elaborate)  |  |  |  |   |   |
| <b>Depth of Rigor</b><br>0 - 1 - 2 - 3<br><i>Low Med High</i>  | ↓  |  |  |   |   |
| <b>Conceptual (Creative)</b><br>List creative stds: i.e., Meaning-making; communication; Creative structure  |  |  |  |   |   |
| <b>Depth of Rigor</b><br>0 - 1 - 2 - 3<br><i>Low Med High</i>  | ↓  |  |  |   |   |
| <b>Procedural (Practical)</b><br>List procedure/ skill stds: i.e., Plan, set goals, organize, self-direct: tools/process/materials   |  |  |  |   |   |
| <b>Depth of Rigor</b><br>0 - 1 - 2 - 3<br><i>Low Med High</i>  | ↓  |  |  |   |   |
| <b>Dispositions</b><br>List dispositions observed/expected: Curiosity, openness, reflection, self-assess...  |  |  |  |   |   |
| <b>Thinking Culture</b><br>Determine observed engagement, focused attention, questioning in class. Is time give? Thinking words used?  |  |  |  |   |   |
| <i>Total Points/ 24</i>  |  |  |  |   | <b>TOTAL:</b>   |

© D. Ingalls Vanada (Informed by Anderson & Krathwohl, 2001; Beattie, 1997; Burnette, 2005; Ritchhart, 2005; Webb, 2005)

## OOO Primary Trait Criteria Definitions:

|   | T- H-I-N-K model for Assessing Quality thinking in Visual Art Classrooms                    |  |   |  |  |
|---|---|--|---|--|--|
|   | Cognitive Process Dimensions  |  |   |  |  |
|   | Level 1:<br>Think (1pt)   | Level 2:<br>Have a Plan (1pt)  | Level 3:<br>Investigate (2pt)   | Level 4:<br>New Ideas (2pt)  | Level 5:<br>Know (3pt)   |
| <i>0= Not observed</i>  |   |  |   |  |  |
| <b>Knowledge Dimensions:</b>  |   |  |   |  |  |
| <b>Factual (Critical)</b><br>(list factual Std: Define situation)           | <i>Asks questions &amp; is interested in the topic; observes; gains strategic knowledge</i> | <i>Records observations/ideas; Arranges and classifies facts; compares/contrasts</i>                       | <i>Analyzes possibilities; makes connections to previous learning</i>   | <i>Draws reasonable conclusions; generates new ideas</i>   | <i>Reasons with evidence; Applies &amp; synthesizes learning to new situations with complexity; Complex ideas are put into visual form; level of expertise</i> |
| <b>Conceptual (Creative)</b><br>(list conceptual Std: Creative structure)   | <i>Asks questions; Recalls pre-learned knowledge; expresses curiosity</i>                   | <i>Compares and contrasts; demonstrates skill in using a variety of art-making techniques &amp; media.</i> | <i>Thinks of multiple solutions; suspends judgment; Works with Big Ideas, choosing own media and techniques</i> | <i>Creates/ designs based on new ideas; Develops projects that express meaning and have personal connection; students plans/sketches ideas</i> | <i>Thinking is "visible" and complex; Applies previous learning in complex and novel ways; Justifies reasons; Abstracts parts into new whole</i>               |
| <b>Procedural (Practical)</b>   | <i>Listens and understands basic procedural expectations; knowledge of tools/materials</i>  | <i>Plans own works of art using sketches, brainstorming, group discussion; Collects data, ideas</i>        | <i>Investigates how/why of procedures, tools, materials, processes, safety, etc.</i>                            | <i>Enacts a plan; entertains multiple options/ manages ambiguity; Solves problems using design thinking processes</i>                          | <i>Shows competency in planning, forethought, self-directed goals &amp; management of time/resources that lead to complex works of art</i>                     |
| <b>Dispositional</b>  | <i>Formulates questions; understands disposition expectations</i>                           | <i>Desires to organize, be curious; freedom is given to question the given; desire to observe closely</i>  | <i>Open-minded and want to make connections, investigate, and explore</i>                                       | <i>Evidence of meaningful choice that leads to ownership, problem finding, desire to incorporate meaning</i>                                   | <i>Uses metacognitive abilities to be reflective, self-correcting; self-assessing; is alert to complex thinking</i>  |
| <b>Culture of Thinking (students' thinking in action/ within the class)</b> | <i>Time given for thinking and/or if teacher models good thinking</i>                       | <i>Routine structures in place; plan exists for thinking</i>   | <i>Opportunities for engaging in questioning/thinking</i>   | <i>Thinking is named, highlighted, noticed, encouraged, "visible"</i>  | <i>High respect for students' thinking; teacher/student respect; sustained level of concentrated focus, desire to elaborate on meanings and skill</i>          |

*\*Note:* With this particular assessment it is important to consider the whole unit, the overall quality of thinking of the students as a class, as well as the learning culture that supports the quality of thinking in students. It is also important to watch and listen for evidence of complex, balanced, and synthetic thinking.

## Appendix K

### The Myself-As-A-Learner Scale (MALS)

#### How I See Myself

**INSTRUCTIONS:**

On the next page you will find 20 statements about learning which I would like you to read. After each statement you will be asked to choose whether this is definitely true about you, a bit true about you, sometimes true and sometimes not, not very true, or definitely not true.

*If you think the statement is definitely true, please circle the #3.*

*If you think the statement is a bit true, please circle the #2.*

*If you think the statement is not very true, or only a little bit true, please circle the #1.*

*If you think the statement is definitely not true, please circle the 0.*

**BEFORE YOU START:**

Please complete the following information about yourself:

Gender:

Male

Female

Age \_\_\_\_\_

Grade Level \_\_\_\_\_

How I identify myself:

African American

Anglo American, Caucasian, White

Asian American/Pacific Islander

Hispanic, Latino, Mexican American

Native American

Mixed/Other

### The Myself-As-A-Learner Scale (MALS)

Circle the number that best describes you. Be as honest as you possibly can. There are no right or wrong answers. I just want to know what you really think about yourself. Remember,

0                      1                      2                      3  
 (Definitely not true)      (No, not much)      (Yes, a bit true)      (Yes, definitely true)

|  |   |   |   |   |   |   |   |
|--|---|---|---|---|---|---|---|
| 1. I am good at showing what I know in art.                                | 0 | - | 1 | - | 2 | - | 3 |
| 2. I like having problems to solve.  | 0 | - | 1 | - | 2 | - | 3 |
| 3. When I'm given new work to do, I usually feel confident I can do it.    | 0 | - | 1 | - | 2 | - | 3 |
| 4. Thinking carefully about your work helps you to do it better.           | 0 | - | 1 | - | 2 | - | 3 |
| 5. I'm good at making things.  | 0 | - | 1 | - | 2 | - | 3 |
| 6. I need lots of help with my art work.                                   | 0 | - | 1 | - | 2 | - | 3 |
| 7. I like having difficult work to do.                                     | 0 | - | 1 | - | 2 | - | 3 |
| 8. I get anxious when I have to do new art work.                           | 0 | - | 1 | - | 2 | - | 3 |
| 9. I think that problem-solving is fun.                                    | 0 | - | 1 | - | 2 | - | 3 |
| 10. When I get stuck in a project, I can usually work out what to do next. | 0 | - | 1 | - | 2 | - | 3 |
| 11. Learning is easy.  | 0 | - | 1 | - | 2 | - | 3 |
| 12. I'm not very good at solving problems.                                 | 0 | - | 1 | - | 2 | - | 3 |
| 13. I am good at expressing my ideas in art.                               | 0 | - | 1 | - | 2 | - | 3 |
| 14. I usually think carefully about what I've got to do.                   | 0 | - | 1 | - | 2 | - | 3 |
| 15. I know how to solve the problems that I meet.                          | 0 | - | 1 | - | 2 | - | 3 |
| 16. I find a lot of schoolwork difficult.                                  | 0 | - | 1 | - | 2 | - | 3 |
| 17. I'm clever.  | 0 | - | 1 | - | 2 | - | 3 |
| 18. I know how to be a good learner.                                       | 0 | - | 1 | - | 2 | - | 3 |
| 19. I like using my brain.   | 0 | - | 1 | - | 2 | - | 3 |
| 20. Learning is difficult.   | 0 | - | 1 | - | 2 | - | 3 |

Used by permission. Source: Burden, 1998