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An Equitable Balance: Designing Quality Thinking Systems in Art Education

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Abstract

Dynamic learning environments in the arts that nurture all students' capacities for deep meaning, synthesis and connection-making have the best chance of standing in the gap toward educational justice. New paradigms for teaching and learning are needed that elevate all students' capacities—not just the select few who excel in narrow subsets of intelligence. This article argues for a more socially just and equitable education that can be realized through and within cultures of thinking that develop students' balanced intelligence.

A mixed model, research study conducted in visual art classrooms is highlighted, reporting the positive effect of balanced, learner-centered pedagogy and environments on the development of students' quality thinking and dispositions. More learner-centered classrooms also positively affected students' self-beliefs. This study resulted in new assessments for measuring students' balanced thinking skills

and dispositions, as well as an emerging theory of "Quality Thinking Systems" (Ingalls Vanada, 2011).

Introduction

In a democratic system that claims liberty and justice for all, it seems that teaching and learning systems should be designed so that all can learn. A narrow definition of academic achievement, narrow views of intelligence, and high-stakes tests that value minimal subsets of intelligence, cannot prepare students as whole and balanced people (Eisner, 2002; Sternberg, Torff & Grigorenko, 1998). K-12 education in the United States has compromised students' thinking abilities and ways of learning, defining aptitude and academic achievement by proficiency in producing a right answer (Eisner, 2002; Gadsden, 2008; Robinson, 2001).

In the current push for 21st century skills—creativity and innovation, critical thinking, communication and collaboration—the Obama administration's America Competes Act of 2011 provided increased attention and funding to STEM subjects (science, technology, engineering and math), while art education continues to be marginalized and underfunded (Wynn & Harris, 2012). The arts are still associated with emotional and subjective ways of thinking, while science and math are considered to be more aligned with logic and objectivity (Robinson, 2001). Yet, greater emphases on math, science, and technology have not guaranteed that our students are able to think in deep, complex, and meaningful ways (Darling-Hammond, 2008). STEAM advocates (STEM together with the arts) claim that the arts are essential (Wynn & Harris, 2012).

Arts education researchers have rallied for placing the arts on the frontlines in fostering students' 21st century skills and dispositions, saying that they have wrongly been left out of the conversation (President's Committee for the Arts and Humanities, 2011). Meanwhile, Palmer laments (2007) that "music, art, and dance are at the bottom of the academic pecking order and the 'hard' sciences are at the top"—perceptions which have placed critical thinking and creative thinking at opposite poles (p. 53). These polarized and misinformed views have failed to promote a balance of creative, critical, and creative capacities in our youth. Subjects in isolation, including art education, taught with a lack of substantive integration (Marshall, 2005), limit the overall potential of our youth—perhaps more so for students in high-need, high-poverty schools (Delpit, 2006; Gardner, 2007; Noddings, 1997; Sternberg, 2008).

The Need for Balance

Most 21st century students have the skills and technology to access facts and quickly. While discipline-specific facts are important, in order to thrive in this fast-changing world, learners must also know how to think creatively and critically to solve problems, collaborate in teams,

use rhetoric to craft an argument, and enact their social-emotional skills. This kind of balanced person is what educational systems—and teachers working across disciplines—should work to nurture (Vanada, 2010). As Jensen mentions in Arts With the Brain in Mind (2001, p. 10), instead of the arts and sciences pitted against one another "in meaningless, irrelevant oppositions such as touchy-feely versus high standards, right brain versus left brain, intuition versus logic, or enjoyment versus hard work," we must focus on providing cultures of learning that develop a sense of curiosity and wonder, along with students' critical thinking, creativity, and abilities to think about their thinking. Besides, advances in brain imaging have outdated the old arts-as right-brained-frill argument; in fact, some training in the arts uses and develops more of the whole brain than most sciences (Jensen, 2001).

In many ways, education has failed to take advantage of the multiple intellectual capacities of students (Gardner, 2007; Noddings, 1997; Sternberg et al., 1998). In order to promote equity through diversity in the broadest sense and to nurture all students' abilities to learn, it is a moral imperative to develop a balance of students' critical, creative, and practical skills and dispositions (Ingalls Vanada, 2010). The full learning potential of more students deserves to be realized, with consideration for their individual learning styles, cultural backgrounds, and personal interests—while not failing at holding all students to high standards for what they can learn and do (Resnick, 1999). Equality does not mean sameness, as Noddings (1997) considers: "Must we declare everyone equal in all things in order to cherish each child and nurture his growth? By trying so hard to pretend that all children are equal in all things, we destroy the very possibility of promoting their real, unique talents" (p. 27). This article suggests that the arts, when designed and taught for balance, depth, and meaning, offer unique opportunities for building students' unique learning power (Claxton, 2007).

The objectives of this paper are to synthesize research on issues related to intelligence and learning in the arts as related to balance that leads to educational equity. This article brings attention to increasing students' capacities to learn and think in balanced ways. As a part of this conversation, I will report on research I conducted in visual art classrooms which highlight the positive effect of balanced, learner-centered pedagogy and environments on the development of students' quality thinking (defined in terms of a balance of critical, creative, and practical skills and dispositions used with depth and complexity). Learner-centered classrooms included the variables of self-direction, connection-making, and inquiry-based practices. This study resulted in new assessments for measuring students' balanced thinking skills and dispositions, as well as an emerging theory of "Quality Thinking Systems" (Ingalls Vanada, 2011).

Defining Intelligence

Decades of converging studies in social psychology and cognitive science challenge

antiquated views of intelligence partly promulgated by the book, The Bell Curve, in which Herrnstein and Murray (1994) insinuated that ethnic differences predicted one's Intelligence Quotient (IQ) and inferred that people of lower socioeconomic status had lower IQs. The authors claimed that student achievement was the natural result of inherited ability from which cognitive elite groups could be decided. Their IQ test measured very limited rational and logical thinking skills—a portion of one's intelligence, not unlike standardized, high-stakes tests that U.S. students continue to take toward college acceptance. The report was controversial and widely contested; it neither took into account environmental factors or Resnick's claim (1999) that any child tested on reasoning or problem-solving alone, without being taught a rigorous, "thinking curriculum" (p. 3), was bound to do poorly. "We don't need to pit excellence against equity. We can harness effort to create ability and build a smarter America," stated Resnick (1999, p. 3).

Successful intelligence theories dispel myths regarding one's abilities and capacities to learn as fixed entities, decided at birth (Sternberg, 2008). Rather, one's intelligence is continuously expandable by effort and the brain's plasticity. Lauren Resnick (1999), at the Institute for Learning at the University of Pittsburgh, defines intelligence as "the sum of one's habits of mind," reminding us that learning capacity is a matter of habits, and habits are things that can change. She states (1999):

> [W]hat people believe about the nature of talent and intelligence--about what accounts for success and failure—is closely related to the amount and kind of effort they put forth in situations of learning or problem-solving. Some people believe that intelligence and other forms of talent are fixed and unchangeable… Other people believe that intelligence is something that develops and grows (p. 2–3).

Dweck's research (2008) indicates that both children and adults hold one of two self-beliefs; either they believe that (a) they're born with a fixed amount of intelligence or (b) that with effort, their intelligence can grow. "Fixed mindset" learners, whose goal is to look smart, rather than to work at getting smarter, often lack resilience and give up at the first sign of challenge, compared to those with "growth mindsets," who show increased motivation and apply more effort to achieve (Dweck, 2008, p. 6). In the realm of creativity, a growth mindset is necessary, because "only a person who is willing to pick herself up and 'try and try again' is likely to forge creative achievements, claims Gardner (2007).

Further, students' belief systems about their capabilities and potential as learners affect their overall capacity to learn (Claxton, 2007; Resnick, 1999). Those who hold a belief that their abilities are expandable with effort, will achieve success because they are willing to risk and engage in challenging tasks that affect their intelligence and achievement (Dweck, 2008;

Resnick, 1999). Art and design classrooms hold potential for providing the kind of positive learning environment that can influence more positive self-beliefs, especially when students are allowed choice in more self-directed projects and designs.

The Arts and Intelligence

Research indicates that students who study the arts make higher grades and score better on standardized tests—a finding that may be of greater benefit for students of low socioeconomic status (Catterall, Chapleau & Iwanaga, 1999). While some researchers have asserted that the effects of arts-rich environments on academic achievement have overall been inconclusive (Winner & Hetland, 2000), breakthroughs in cognitive science have led to links as to influence of the arts on cognition, especially due to increased engagement, sustained attention, and perseverance (Csikszentmihalyi, 1990; Posner, Rothbart, Sheese & Kieras et al., 2008). Cognitive psychology and neuroscience have also taught us that motivation and affective domains drive attention, perceptions, cognition, memory, and thus thinking (Bransford, Brown & Cocking, 2000; Dweck, 2008; Resnick & Hall, 2005). Intelligence is expandable and multifaceted, impacted by learning dispositions and students' motivation to learn (Ingalls Vanada, 2011; Resnick, 1999).

In seeking to find out if smart people are drawn to the arts or if arts training makes people smarter, the Dana Foundation (2008) conducted a three-year "Learning, Arts, and the Brain" study involving cognitive neuroscientists from seven leading United States universities. Results of this study confirmed longstanding correlations between arts training and improved cognition (Gazzaniga, 2008) and answered former calls for research regarding the "possibility that sustained and deep learning in the arts may cultivate habits of mind and dispositions impacting future problem-solving behavior" (Dana, 2008, p. 157). In particular, Posner and colleagues' multi-modal study (2008) provided further evidence that sustained attention in the arts leads to greater efficiency of children's key attention networks in the brain, which in turn, lead to increased motivation as well as overall improved cognition and transfer (Gazzaniga, 2008). The Dana study also confirms Catterall's arts-based research (1999) that transfer of one's learning to other subjects is predicated on sustained and deep learning.

Do the Arts Develop Balanced Thinkers?

When taught well, art and design education prepare students with a balance of thinking and process skills (critical, creative, and practical), as well as the social-emotional dispositions to navigate the changes that 21st century life promises to bring. Nurturing creative, and flexible, yet critical, lifelong learners is the goal. Sternberg believes that 21st century students must "learn and change consciously, continuously, and quickly" in ways unsupported by skills alone (2008, p. 62).

It is proposed that when the arts are taught for balance, depth, and meaning, there is greater potential for positive change for students. It is argued that an education which includes art and design holds the potential to advance students' innovative and reasoning skills but can also advance their abilities for independent thinking, self-initiation, collaboration, and finding creative solutions to problems (Burnette & Norman, 1997; Costa, 2006).

Since not all arts classrooms teach for creativity, Cunliffe's (2007) findings on the lack of balance regarding creative and critical thinking in visual arts curricula, serve as a particular challenge to contemporary arts teachers. Yet when taught well and for both skills and dispositional development, arts-based learning is uniquely suited for providing curricular balance to educational systems, while strengthening and deepening learning for students (Luftig, 2000). Educational equity is a more near reality when the arts are at the core of a well-rounded curriculum and teachers purposefully build cultures of thinking and learning (Ritchhart, 2002)—an aspiration that is poorly served by decreased arts instruction in schools. Research studies in art education programs that are more 'learner-centered' are known to enhance qualities of thinking in balanced ways (Bailin et al., 1993; Ingalls Vanada, 2011; Sternberg et al., 1998). A learner-centered environment is defined as one that purposefully embeds inquiry-based and connection-making practices, as well as fosters student self-direction (Ingalls Vanada, 2011). Learner-centered classrooms share conceptually close connections with constructivist philosophy, wherein students construct knowledge through experimentation and project-based investigation (Dewey, 1938). Visual arts and design classrooms that approach learning as a mode of inquiry, foster connections to other disciplines, and develop student agency in the finding and solving of problems tend to be more learner-centered (Vanada, 2011).

Conceptual Framework: Intelligence as a Complex System

Conceptual frameworks for my reported research project build upon foundations regarding how people learn, what constitutes intelligence, and the nature of knowledge and provide additional support for the role of arts-based learning in terms of balance. Expandable and integrative definitions of intelligence have been confirmed by cognitive science research, saying that aptitude is expandable as one learns and grows; it is continually adapting to and synthesizing new information and new experiences (Caine & Caine, 1994; Gardner, 2007). People's capacity to learn also includes important motivational and affective facets. Perkins and Ritchhart (2004) emphasize the effects of classroom and school cultures on dispositional aspects of thinking, finding that positive cultures of thinking nurture good thinking and develop deeper understanding. In other words, quality thinking is not simply a matter of acquiring a set of skills; it involves the development of specific dispositions—the inclination, sensitivity and ability to act upon one's skills in synthetic, multidisciplinary ways (Perkins et

al., 2004). Over and above ability, research reveals that dispositions such as motivation, persistence, and risk-taking contribute to intellectual behavior and deep learning (Claxton, 2007; Posner et al., 2008; Resnick, 1997).

Art and design training are known to develop at least five attributes or dispositions (Sternberg & Lubart, 1999): (1) Tolerance of ambiguity; (2) Perseverance; (3) Willingness to grow; (4) Openness to experience; and (5) Willingness to take risks. Each of these mindsets are related to self-assuredness, independent thinking, courage of mind and spirit, and the ability to resist peer pressure, which are vital in the development of student agency and responsibility. In turn, student agency affects one's ability to manage ambiguity, failure, and adversity—key dispositions necessary for success in life and work. Sternberg (2008) highlights the development of one's reasoning, resilience, and responsibility as related to achieving goals and growing toward wisdom.

Project Zero researchers agree, highlighting the importance of the arts for balancing creative and critical analysis with openness to multiple viewpoints and solutions (Eisner, 2002; Tishman & Palmer, 2006). Fine arts students have been found to score significantly higher than non-arts students on open-minded inquiry and critical thinking, suggesting that learning in the arts may significantly enhance these dispositions (Lampert, 2006). Based on what we know about how students learn, how the brain learns, and the role of dispositions and agency in learning, static, passive views of learning and knowing are challenged to give way to more meaningful, constructivist epistemologies known to the arts, including social, contextual, and affective facets of learning (Gadsden, 2008). It is no secret that teaching and school systems must change. Learning as construction of understanding (also labeled constructivism) serves as a conceptual framework for my research.

Conceptual Framework: Constructivism

Learning is no longer considered an accumulation of facts, but rather the ability to construct knowledge in meaningful ways toward a well-defined problem (Bransford et al., 2000). The process of coming to know is developmental; it takes place over time and requires reflection and connection-making—between and across disciplines. Piaget (1969) claimed that young people do not simply absorb what they see or hear; they come to the place of true understanding through experience, using active processes of reasoning and interpreting, or inferring from new information. "Humans don't get ideas, they make ideas," says Costa (2006, p. 63).

This constructivist interpretation of learning draws heavily upon the thinking of John Dewey (1938), whose philosophy emphasizes teaching as an integrative, creative and reflective act; the social and reconstructive purpose of education; the importance of learning in community;

human experience as the beginning point for any curriculum; the interrelatedness of knowledge; the motivating desire for personal meaning which is a necessary characteristic of educational experience; and the centrality of inquiry and reflective thinking in all learning. Constructivism is supported by a vast contemporary research base as to its effectiveness in driving deep understanding (Bransford et al., 2000; Cullen, Harris & Hill, 2012).
In order to develop creative, yet self-directed and resilient thinkers and learners, constructivist philosophy is a move away from classic industrialist models of teaching and learning (Robinson, 2001)—each subject in isolation from others—toward a more integrative paradigm, that is, learning that is "organized around problems or issues rather than strictly discipline content" (Cullen et al., 2012, p. 57). Focusing more on complex, big ideas of social concern allows for honoring student diversity and cultural ways of knowing which require authentic, real-life solutions (Walker, 2001). In these big idea classrooms, students make connections from disparate sources and across disciplines, developing what Howard Gardner (2007) calls, "a synthesizing mind" (p. 45). In the visual arts, learning becomes more in-depth and broad, beyond nice end products, where students research "bigger, more difficult questions and take time to ponder and reflect. The more challenging and ambiguous the problems, the better. The more disciplines learning involves, the better," says Jensen (2001, p. 10).

Constructivism shares conceptually close connections with learner-centered philosophies and project- and design-based pedagogy (Burnette & Norman, 1997), which are credited with activating a balance of students' creativity, analytical thinking, and practical skills and dispositions through hands-on learning (Ingalls Vanada, 2011). Constructivist learners engage in inquiry-driven, project-based, collaborative, and reflective processes, which better develop their abilities as critical thinkers and creative problem solvers (Cullen et al., 2012; Dewey, 1938; Weimer, 2002). The teacher role shifts to becoming a co-learner and guide, and responsibility for learning is placed in the hands of the students who are active, not passive, participants in the construction of knowledge (Weimer, 2002). Noddings (1997) encourages these Renaissance-type teachers to lead through dialogue and their own perennial questions. It is easy to see why learner-centered classrooms are known for being more democratic environments of learning that promote student choice, student ownership and responsibility (Dewey, 1938)!

Greater student autonomy, self-direction, creativity, and increased motivation are reported in more learner-centered classrooms (Cullen et al., 2012), even though students more familiar with traditional, top-down, and controlled instruction often resist this type of learning at first. Ingalls Vanada (2011) found that learner-centered practices have a significantly positive effect on art students' positive mindsets about their intelligence, learning ability, and understanding in more learner-centered environments. More research is needed into the ways positive self-

beliefs can lead to greater motivation, perhaps resulting in increased overall learning capacity (Ingalls Vanada, 2011) as well as how students' beliefs about their learning as related to effort and ability might be predictors of student achievement (Resnick & Hall, 2005).

Aims of the Study and Theoretical Framework

This article summarizes findings from a mixed model research study (QUAL + QUAN data) involving students' quality thinking in visual art and design classrooms. Quality thinking was defined as a balance of critical, creative, and practical thinking skills and dispositions, applied with depth and complexity (Ingalls Vanada 2011). The purpose of the research project was to explore middle school students' balanced thinking in visual art classrooms ranked as more or less learner centered (Ingalls Vanada, 2011). More learner-centered classrooms were those that employed inquiry, self-direction, and connection making to a greater degree, as aligned with the theory of balanced intelligence (Figure 1).

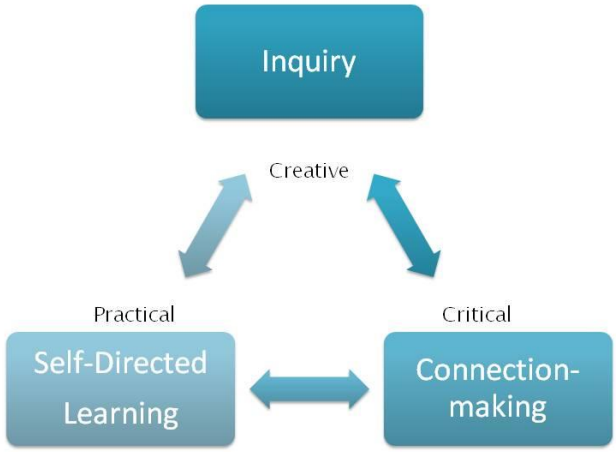

Figure 1. Balanced Learning Environments

Through this research, I sought to understand the kinds of teacher pedagogies and classroom environments that foster students' quality thinking as well as their positive learning mindsets through two research questions:

– 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?
– How do students perceive their intelligence and understanding of a subject in

these classrooms?

Sternberg's (2008) successful intelligence theory provided a theoretical frame and supported the holistic philosophies as better indicators of student success in life and learning. According to Sternberg (2008), intelligence is comprised of three separate, though interrelated, abilities: analytic, creative, and practical. One needs the critical thinking skills to analyze and solve problems, the creative skills to bring new ideas and solve problems in new or insightful ways, and the practical skills necessary to apply his or her knowledge with quality and real-world savvy or adapt to various contexts in everyday life. Throughout, wisdom is essential for applying a balance of one's skills and dispositions in ways that consider the common good (Craft, Gardner & Claxton, 2007; Sternberg, 2008).

Data and Results of the Study

The quantitative (QUAN) results of this study indicated that classrooms ranked as more learner centered showed significantly positive correlations with students' overall balanced intelligence (.935 at the .05 level). The higher a classroom's rank for learner-centeredness, the higher students' quality of thinking (Table 1), while classrooms with a lower rank for learner-centeredness resulted in lower quality thinking scores. This analysis indicates that classroom environments and teacher pedagogy have a positive impact on students' creative, critical, and practical thinking skills and dispositions.

Table 1.

Correlations of Total Scores with Rank and Rank Scores

		LEARN	**RANK**
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).

The Assessment Matrix

While this study in its entirety goes beyond the scope of this article, a primary result of this work was the development of a matrix of assessments similar to the Rainbow exam developed by Sternberg (2008). The matrix design operationalized the theory of balanced intelligence (Sternberg, 2008) yet was redesigned to be domain specific to visual art and design. This new way of assessing students' balanced thinking utilized seven sub-'tests' in three domains: (1) analytical, creative, and practical skills, (2) analytical, creative, and practical dispositions, and

(3) overall quality of thinking. Teacher-rated, researcher-rated, and student self-assessments were created based on extensive 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 (see Ingalls Vanada, 2011). This seminal work accounted for the dispositional elements involved in people's overall quality thinking, not included Sternberg's Rainbow matrix (2008).

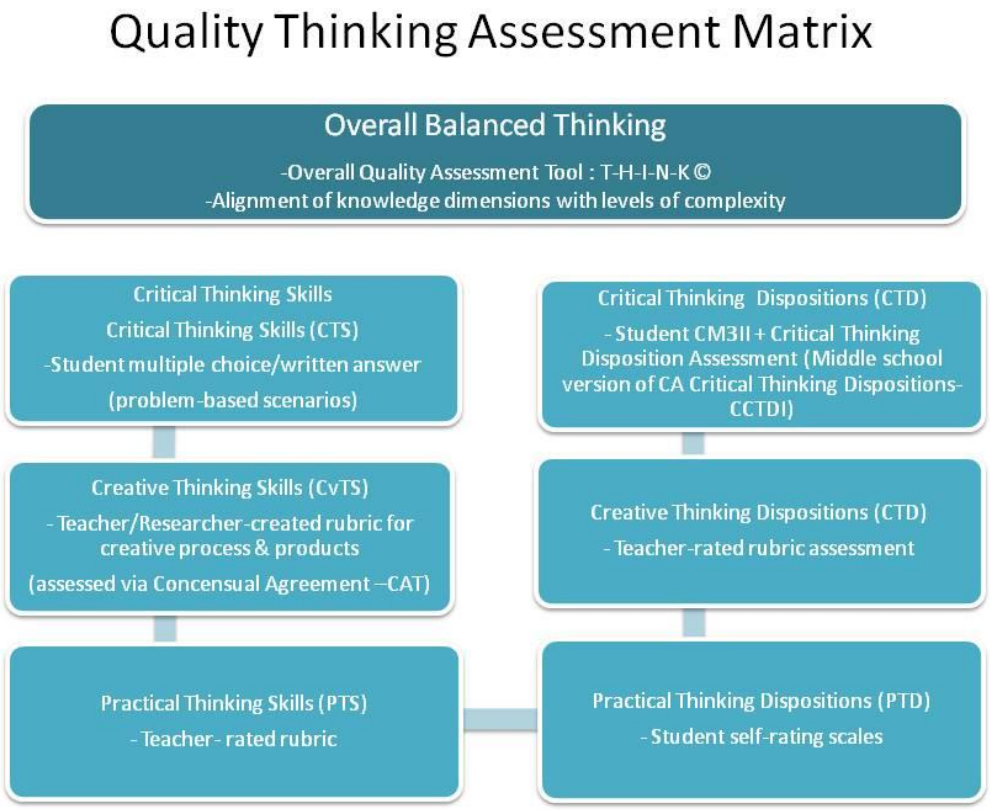

Figure 2. The Quality Thinking Assessment Matrix

The Emerging Theory of Quality Thinking Systems

Qualitative (QUAL) data (field notes, researcher observation notes, and informal interview notes) were analyzed using an inductive, open-coding method through repeated readings and categorization of words and phrases. Data were recoded as patterns developed, and recurring evidences strengthened conclusions and validity. The knowledge gained and gathered during this open coding analysis of data led to overarching themes (Miles & Huberman, 1994) and eventually an emerging theory of "Quality Thinking Systems" (Figure 3).

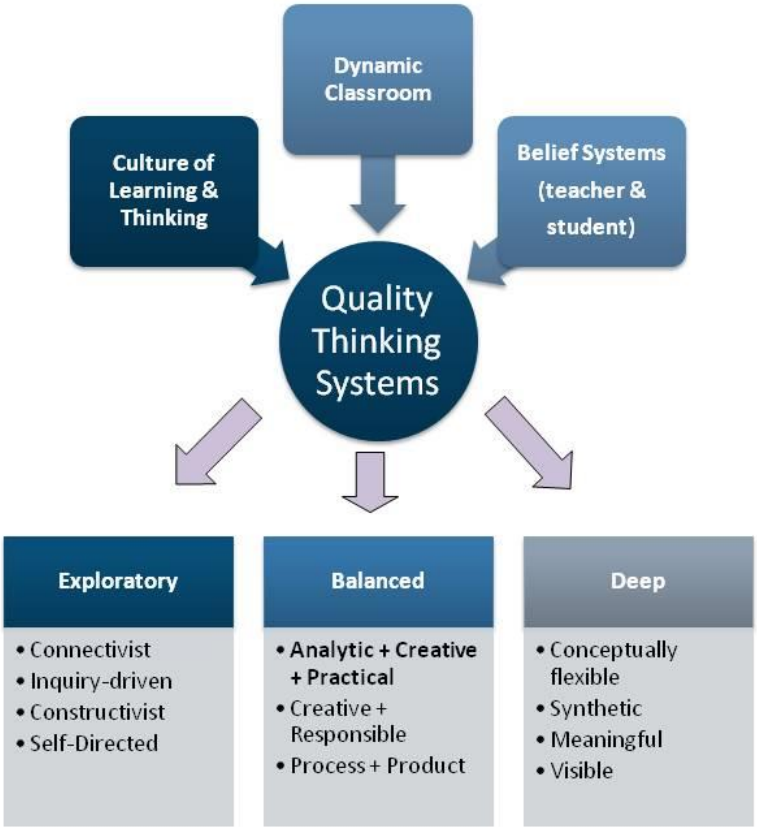

Figure 3. Quality Thinking Systems Model

Three overarching categories of (1) Dynamic classrooms, (2) Cultures of thinking and learning, and (3) Belief systems (self, teacher, school), led to three categories which described the type of learning and thinking outcomes characteristic of more learner-centered classrooms as those that are more: (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).

Key evidence statements from the data articulate the overarching concepts that led to the three descriptors (exploratory, balanced, and deep) of dynamic classrooms (Figure 4):

Conceptual Theme	Description of Sub-Theme(OUTCOMES)	Evidence Statements (OBSERVATIONS)
Dynamic Classroom	• Empowering classroom culture (respect & shared responsibility) • Personal connection and communication (teacher cares, guides, connects--not sage on a stage) • Shared responsibility and support • Curriculum is flexible and open/shaped by reflection (democratic) • Learning as balanced (Process + product)	"Teacher trusts students, gives autonomy "High degree of student self-direction…" "Teacher asks students what steps *they* need to take to improve their work; spends time in individual critique" "Students engage in a design-thinking process (exploring, planning, refining, enacting a plan)" "Classroom possesses a 'magic balance' of creative, real-world practicality and critical thinking (reflection)" "Teacher models curiosity" Vs. "Students seem disconnected from each other" "Teacher is non-emotional, non-engaged; distant" "Creative risk-taking/creative leaps are low in this class"
Culture of Learning and Thinking	• Culture that encourages risk-taking, questioning, investigation • Nurtures 21st century thinking (critical & creative + responsibility) • Metacognitive • Understanding is deep, connected & flexible • Knowledge is demonstrated/visible • Class organized for thinking vs. survival	"Encourages innovation, not sameness: Note on whiteboard says 'Is it common, or is it unique?'" "Creativity and complexity of projects shows deep understanding" "Self-motivation is high; high degree of engagement…" [Teacher] "bases lesson planning on reflective practice" "Presentations/critiques = students' visible thinking" "Time for reflection; self-assessment" Vs. "Personalization and connection-making are not priorities (largely teacher-driven in project decision…) "Questioning is not valued, no time given to inquiry" "Students' projects reflect the teacher's input/ideas"
Belief Systems	• Values the whole person: body, mind, spirit • Epistemological belief that all have capacity to achieve • Knowledge of affect of self-perceptions/beliefs on learning Pedagogical belief: • Teacher as guide/facilitator • Knowledge is constructed • Intelligence as flexible, ongoing, expanding	"Students are allowed autonomy and independence…" "Teacher tries to strike the balance between keeping the learning on track and valuing students' personal desires" "Talks to students—a lot. Engages!" "Treats the classroom and students as apprentices" "Teacher is enthusiastic about their own desire to learn more…to try out new ideas" Vs. "More emphasis on final product than on process" "students were not encouraged to make connections" "Teacher doesn't feel there is time to discuss or question in class" or "able to wrestle with big ideas"

Figure 4. QUAL Data: Themes and Evidence

The emergent theory operates on the hypothesis that quality thinking systems, as observed in more learner-centered classrooms, are 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.

The Quality Thinking Systems theory lends insight into the ways that learning environments—especially those more learner centered—are dynamic systems that work to advance students' overall learning capacity (Ingalls Vanada, 2011). Surely, building students' quality thinking is a complex interplay between learner-centered pedagogy (connection making, inquiry, and self-direction) and the development of balanced thinking and dispositions, which are highly affected by the learning culture or environment.

Self Beliefs and Learner-Centeredness

For research question two, data were collected using a questionnaire regarding students' self-beliefs or perceptions regarding their learning and thinking in classrooms designed to be more learner-centered, and those designed to be less so. In quantitative correlational analysis, a significant positive relationship existed between students' self-beliefs or how they viewed themselves as learners and classroom scores for learner-centeredness (.933 at the .05 level). This correlation 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. Classrooms designed to be more learner-centered seem to have more impact upon the affective components of the learning process.

So what can teachers and administrators do to create more learner-centered classrooms that reflect learning that the theory of Quality Thinking Systems? How can learning in arts and design-based classrooms become more exploratory, balanced, and deep as the research indicates? A few implications in respect to art and design are offered here.

Learning that is Exploratory

Globalized society has brought interdisciplinary concerns to the forefront, demanding a synthesis of students' critical, creative, and practical skills for success in life. The classic industrialist model of teaching and learning—each subject in isolation from the others and

presented in linear ways—no longer provides students with the skills they will need in the context of globalization and creative economies.

Exploratory learning environments, as defined by the Quality Thinking Systems theory are those that are connectivist, inquiry-driven, constructivist, and self-directed. While many of these ideals have been reported throughout this article, we have learned that, by definition, learner-centered classrooms are more integrative and filled with big ideas—"ideas that transcend disciplinary boundaries" (2010, p. 13).

Through the integration of significant ideas across disciplines—the sciences, mathematics, engineering, or other areas of the humanities—the arts provide diverse entry points into learning that activate the synergistic, connecting properties of the brain (Caine & Caine, 1994). For developing deeper cognitive and dispositional skills, as well as fostering learning that is layered and more connected, arts integration continues to be valid and necessary (Marshall, 2005). Inquiry-based practices in the art classroom enhance students' thinking in areas of problem-solving, justifying choices with reasoning, and making connections (Burnette & Norman, 1997).

Questions that persist about the validity of integration practices in contemporary art and design education are challenged to "understand that art is inherently connected to all disciplines," as it is a form of inquiry that explores concepts and real life issues with overlapping goals to other subjects, as Marshall (2010) explains:

> This commonality between content and methods in art and other disciplines has always been true, but it is particularly evident in integrative contemporary art. Current conceptually based art blurs disciplinary boundaries with its methods and content while simultaneously emphasizing a research component and drawing attention to disciplinary practices outside of art. Contemporary integrative art is, therefore, key to reconciling curricular integration and the study of art. It not only supports the notion that an integrated study of big ideas and interdisciplinary content are intrinsic to art practice, but also offers models for practicing integrative art." (pp. 13–14)

Project and design-based approaches which focus more on inquiry through 'big ideas' and the thinking process rather than the media end products, fall in line with these ideals. A design thinking approach to art curriculum fuses authentic, constructivist, inquiry-based learning as suggested in the research reported in this article (Burnette et al., 1997; Ingalls Vanada, 2011). As with learner-centered pedagogy, project and design-based education offers real-world problem solving, together with building empathy, creativity, and ethical responsibility.

Learning that is Balanced and Deep

Throughout this article, I have reported on the benefits of balanced learning environments and teaching and curriculum that foster a balance of students' creative, critical, and practical capacities and dispositions. Art and design classrooms hold potential for leading the way in developing balanced and powerful thinkers and creators (Claxton, 2007), yet this will not happen by accident. The research of Sternberg and 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. In both traditional assessments and performances that demonstrate their understanding, students taught in a balanced way outperform those in classrooms which emphasize memory or analytical thinking alone (Sternberg & Grigorenko, 2004).

In order to train independent, flexible learners who possess a balance of thinking and process-oriented dispositions, teachers should capitalize on designing more open-ended, project-based inquiries to increase motivation (Burnette & Norman, 1997). Afterall, teachers are designers of meaningful learning experiences and student engagement (Bransford et al., 2000; Dewey, 1938; Jensen 2001). It is the quality of the experience that counts, which is why Eisner (2001) could say: "Teachers cannot merely transmit information or skill… "the teacher…needs to behave like an environmental designer, creating situations that will, in turn, create an appetite to learn" (p. 50).

Creating a caring and thinking culture that does not silence or smooth over differences out of denial or fear, but addresses social issues without promoting color blindness, also invites empathy, understanding, and deeper learning (Delpit, 2006; Noddings, 1997). Dialogical classrooms view learning as a collaborative exchange in which thinking is valued, visible, and actively promoted (Ritchhart 2002), and in these environments deeper conversations can allow for trust-building and change (Delpit, 2006). Socratic questioning is offered as a pedagogical tool in art and design classrooms for exploring alternative points of view, investigating big ideas, and activating cognitive processing (Caine & Caine, 1994).

One of the ways that art and design can spark critical conversations is through inquiries into visual culture as connected to real life experience and the integration of critical pedagogy (Freire, 1973). Students can investigate how visual culture, their own artwork, and historical works of art are linked to various perspectives: cultural, historical, aesthetic, political, social, or ethical and create works in response to their personal experiences or research (Marshall, 2010).

In Summary

In order to equip students toward success in learning and life in the 21st century, there has been a recognized need for educational environments that value critical, creative, and practical thinking that promote a depth of understanding and meaning (Perkins, 2003; Sternberg, 2008). Continued educational imbalances that are a detriment to students' capacities for learning and success in life, should not be tolerated (Sternberg, 2008). A failure to address students' full capacities discounts them as whole persons, and it is inequitable.

The reported arts-based study contributes to existing knowledge on quality thinking as defined through balanced and deep thinking (Sternberg & Grigorenko, 2004). As suggested through this study, students' overall quality of thinking was best measured and observed in balance: critical, creative, and practical skills and dispositions, as held to a standard (complexity) (Ingalls Vanada, 2011). A theory of Quality Thinking Systems (Ingalls Vanada, 2011) lends insight into the ways classrooms are dynamic systems that influence student commitment levels and increased capacity to learn (Claxton, 2007).

In order to develop the flexible, innovative, synthesizing minds and hearts of today's students, silo mentalities must be abandoned and more connected and meaningful learning, embraced. In the spirit of equity and justice, may contemporary art and design classrooms influence and lead the way. Guiding students' successful intelligence through supportive and balanced cultures of thinking and learning that are more exploratory, balanced, and deep is one step in the right direction.

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