ABSTRACT

IS QUANTITATIVE DATA-DRIVEN INSTRUCTION APPROPRIATE

IN VISUAL ARTS EDUCATION?

By

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The use of quantitative Data-Driven Instruction and Assessment in the visual arts curriculum could impact the outcome of student creativity if employed within the visual arts, a content area that uses primarily qualitative pedagogy and assessment. In this paper I examine the effect upon measured creativity resulting from the use of Quantitative Data-Driven Assessment compared to the use of Authentic Assessment in the Visual Arts curriculum.

This initial experimental research exposed eighth grade Visual Arts students to Authentic Assessment in one group, and Quantitative Data-Driven Assessment in another. Two experiments were conducted from the results. In the first experiment, both groups of student post-test art works are compared for mean creativity scores as defined by an independent expert panel of Art Educators. The second experiment compares for gains in pre-test/post-test creativity as the teacher assessed. Gains in mean creativity scores are compared between groups. Difference in assessment motivations are discussed as possible influencing factors.

IS QUANTITATIVE DATA-DRIVEN INSTRUCTION APPROPRIATE IN VISUAL ARTS EDUCATION?

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THE PROBLEM

Introduction and Statement of the Problem

Since the No Child Left Behind mandate of 2001, Data-Driven Instruction and Assessment in classrooms has become a widely utilized method of assessment of student achievement. In the attempts of uniform implementation across schools and districts, some administrators have employed Data-Driven Instruction and Assessment across the scholastic curriculum school-wide. Due to the predominantly quantitative data requirements employed in collecting and analyzing quantitative assessment data, the employment of quantitative Data-Driven Instruction and Assessment in the visual arts curriculum could influence a difference in creativity in student work. If this difference in creativity becomes a limitation or measured decline of creativity as an output, employing quantitative Data-Driven Instruction and Assessment could limit and excessively narrow quality of the visual arts curriculum, a content area that uses primarily qualitative pedagogy and assessment, and a content in which demonstrated creativity in student process and product is one of many desired outcomes (Zimmerman, 2010a).

One of the most important outcomes of an education with art includes encouraging "creativity and innovative thinking in young minds" (Dwyer, 2011, Presidents' Committee on the Arts and the Humanities, [PCAH] p. 8). Creativity as an applied skill in employees has been named as highly desired by employers, surpassing the

importance of basic knowledge and ranking in the top five of applied skills (Ruppert, 2010). While Art Education does not hold the monopoly on teaching creativity within the schools, it is one of the core academic subjects where the success of the art program is continually approved or condemned by the creativity of the curriculum, and the demonstrated creativity of the student work produced, or the end product. Art Education curricula regularly use creativity as a vehicle with which to acquire and practice the higher-order thinking skills and communication skills, which educational reformers strive for students to aspire (U.S. Department of Education, National Assessment of Educational Progress, [NAEP] 2008). Therefore, not only is creativity a large part of the Art Education end product, it is integral to the process of making, and also to the pedagogy and curriculum. Due to the nature of Art Education's symbiotic relationship with creativity, with the recognition that creativity is a major part of what students aspire to practice and demonstrate in a Visual Arts course, the author posits that it is essential to this study to investigate creativity and its relationship to Visual Arts pedagogical and assessment methodologies.

In quantitative Data-Driven Instruction and Assessment students take formative and summative assessments that are aligned to specific academic standards (state or national standards in the pre-Common Core era, or now the electively adopted Common Core State Standards). The assessments are designed by the teacher, test designer, or textbook publisher to be closely representative of, if not modeled directly after, content on state and national standardized achievement tests. The driving focus in data-driven instruction is the creation of and implementation of the assessment, with the pedagogy

and curriculum aligned to these tests in order to attain higher assessment results (Bambrick-Santoyo, 2010; Mertler, 2014; Sindelar, 2011).

Data-driven tests are mostly quantitative in nature using mostly true/false, multiple-choice, and scored rubrics to assess student mastery of standards. When used along with bubble-style test sheets and OCR software, the data-driven instruction software compiles student score data by overall results, mastery of specific standards, and progress over time. Frequent assessments are recommended for a record of results over time. Also key to the success of Data-Driven Instruction is the alignment of the assessments and curricula to the content standards.

Data-Driven Instruction and Assessment allows this data to be shared among all stakeholders: teachers, students, parents, administrators, and so forth. The immediate, quantitative feedback provides educators with the opportunity to group low performers by content area or standard, and to design and provide targeted student interventions. Pedagogical shifts can be made after a teacher reflection of what the report of student scores demonstrates. If implemented by the teacher with an opportunity for error analysis by the students, students can reflect on their own mastery of content standards, reconsidering patterns of thought that may have led to the initial errors specific to the content standard. Longitudinal score data can be an opportunity for student reflection on their own progress of standards mastery.

This quantitative true/false, Multiple Choice, or scored rubric analysis employed in quantitative Data-Driven Instruction and Assessment is appropriate for employment in content areas that are quantitative and convergent by nature quantitative and convergent subjects usually present one right answer to attain. The score reflects the student's

answer was either correct or incorrect. According to the data collected, the student either mastered the content standard linked to that test question or did not.

In content areas that are dominantly qualitative and divergent in nature, as in the Visual Arts, there is an opportunity to examine the suitability of this type of assessment as implemented within the Visual Arts. Specific to the Visual Arts curriculum in California, there is elasticity within the California Visual and Performing Arts content standards and the newly released National Core Arts Standards (at the time of this initial experimental research) to allow for pedagogical shift responding to the fluid and ever changing cultural and political dominances, shifts in aesthetic philosophies, and even to allow for fluctuations in the availabilities of supplies and media or the fluctuations of the budget specific to each individual classroom (CDE VAPA, 2001; NCAS, 2014).

The experience of teaching and learning within the visual arts are contextual according to medium, technique, aesthetic philosophies, cultural influences and cultural/societal mores. The elasticity of the California State Visual And Performing Arts Standards and of the National Core Arts Standards is necessary due to the dynamic nature of all the arts, and to meet the needs of the students and the educators' immediate community. California State Superintendent of Public Instruction encourages educators to use the standards to design the curriculum and subsequent instructional strategies to fit the needs of their local communities (CDE, VAPA, 2001; NCAS, 2014).

Learning within the visual arts employs a style of analysis and thinking that is primarily divergent in nature. Often there are many possible correct answers to the questions asked in a visual arts curriculum. Since some of the aim and purpose of education in the Visual Arts is to build creativity and encourage communication and

innovation, “such as problem solving, creative thinking, effective planning, time management, teamwork, effective communication, and an understanding of technology” according to Ruth E. Green, President, California State Board of Education (CDE, VAPA 2001, p. v). which are divergent and qualitative in instructional nature, is it possible that assessing the Visual Arts through convergent, quantitative measures would be inappropriate in seeking accurate data from which to drive instruction and pedagogical shifts? “Creative learning is multidimensional. It challenges established thinking and practice in assessment, requiring a creative solution” (Ellis, 2008, p. 1).

Shannon Pella argues that quantitative data obtained in data-driven instruction is not sufficient in qualitative subjects. “The information from a test score is general and vague and often reveals little about what could have been done differently during instruction. …The quantitative data alone from this data-driven pedagogy is insufficient in developing a responsive pedagogy” (Pella, 2012, p. 59).

Since the aims and pedagogies of the Visual Arts overall are often to encourage divergent thinking, to increase creativity and innovation (Zimmerman, 2010a), it is possible that the quantitative and convergent data collected from quantitative and convergent Data-Driven Instruction and Assessment could be extraneous to Art Educators and counterproductive for desired outcomes for student learning and achievement.

Perhaps a case can be made for revising the data collection and analysis tools and software for the purpose of collecting and analyzing the qualitative data readily available and regularly employed within the Visual Arts curriculum. People with different work roles have different data needs. Coburn and Talbert advocate for collecting and

employing a wide range of data in order to answer all the questions that different people confront in different work roles (Coburn, 2006).

For the purpose of this initial experimental research, I will examine the suitability of the use of quantitative data-driven instruction and assessment in the Visual Arts curriculum.

Purpose of the Study

An initial experimental research was conducted involving eighth grade Visual Arts students in a classroom setting, compared for creativity as measured two ways: contextually, and consensually. The purpose of this study is two-fold:

1. The comparison of creativity between a control group utilizing Authentic Assessment and an experimental group using Quantitative Data-Driven Assessment through an initial experimental study involving an expert panel of appropriate observers.

2. A comparison of gains in mean creativity scores between a control group utilizing Authentic Assessment and an experimental group using Quantitative Data-Driven Assessment through an initial experimental study utilizing pretest and posttest scores for creativity from teacher evaluations.

Need for the Study

The findings of this study will be useful for students, parents, Art Educators, other-content educators of subject areas that primarily rely upon qualitative assessment, School Administrators, Curricular Specialists, school stakeholders, post-secondary education institutions, and employers. It is anticipated that the results from this initial experimental research will assist development of a data collection and analysis tool

specific to the content of Art Education specific to visual arts education, supporting continued Art Educator usage of best practices for visual arts instruction.

Although this initial experimental research specifically addresses the immediate concerns of the author's inquiry; California Visual Arts Education in grades 7 to 12, with focus on the California State Standards and the implementation of the recently released National Core Arts Standards (NCAS, 2014), the information found could be relevant across the varied Visual and Performing Arts disciplines, and other educational areas in which Authentic Assessment is the currently the dominant form of assessment.

Definition of Terms

The following definitions are provided for key terms used in this study:

Data-Driven Instruction and Assessment: A quantitative assessment tool used to gather, score, compile data reports specific to student scoring on teacher-created questions directly linked to the content standards. Such tools may include but are not limited to Data Director, Illuminate, TetraData, EDmin, Cognos, and Schoolnet.

Quantitative assessment: Assessments in which responses can be readily measured against a standard of correct or incorrect. Most quantitative assessment data are answers in the form of true/false, or Multiple Choice.

Qualitative assessment: Assessments in which responses can be readily measured contextually, and subjectively. Qualitative assessment data can take the form of the following, but are not limited to: analysis of student interviews, group critiques, journal writing, and concept mapping.

Authentic Assessment: The qualitative style of assessment used throughout Art Education, including in the Visual Arts, including the measurement of "intellectual

accomplishments that are worthwhile, significant, and meaningful, as compared to multiple choice standardized tests" (Wehlage, Newmann, & Secada, 1996, p. 23).

Standards-Based Grading: A grading system in which all assessment grades are tied directly to mastery of a pre-defined content standard. Performance objectives for students demonstrate a level of mastery of the particular content standard when utilizing standards-based grading.

Creativity: The experience of creating something new and valuable, that transcends traditional ideas, rules, patterns, relationships. The creation can be meaningful new ideas, forms, methods, interpretations, processes, or products.

Consensual Definition of Creativity:

> A product or response is creative to the extent that appropriate observers independently agree it is creative. Appropriate observers are those familiar with the domain in which the product was created or the response articulated. Thus, creativity can be regarded as the quality of product or responses judged to be creative by appropriate observers, and it can also be regarded as the process by which something so judged is produced. (Amabile, 1983, p. 357)

Contextual Definition of Creativity:

> A product or response will be judged as creative to the extent that (a) it is both a novel and appropriate, useful, correct or valuable response to the task at hand, and (b) the task is heuristic rather than algorithmic. (Amabile, 1983, p. 369)

Visual Arts Education: The two-dimensional and three-dimensional media of Art Education addressing primarily the Visual Arts, including but not limited to Drawing, Painting, Sculpting, Ceramics, Graphic Design, Printmaking, Digital Media, Film, Fibers,

Jewelry, Wood, Metals, Electronic Media, Art History, Art Criticism, Aesthetic Philosophy.

Convergent thinking: The thought process of sorting through many options and processes to find one right answer. Joy Paul Guilford (1957) defines it as giving the "correct" answer to questions that do not require considerable creativity.

Divergent thinking: The thought process of exploring multiple options and processes to find many possible right answers. A process used to generate ideas by exploring multiple possible solutions.

Medium: In the Visual Arts, the materials specific to the product of an art work. The properties and employment of technique can vary within a group of media, adding further considerations while assessing student work in the visual arts. For example, within the realm of painting, oil paints require different supplies and the employment of different techniques from the supplies required and techniques used in watercolor paints, acrylic paints, and gouache and tempera paints. Similar considerations and differences are found throughout all groupings of medium within the Visual Arts.

Technique: The medium-specific procedures employed when creating works in the Visual Arts.

Aesthetic Philosophy: The cultural and philosophical lens through which a person views, analyzes, values, and makes judgments about a work of art.

Cultural Mores: The dominant values and social preferences within a culture.

Bloom's Taxonomy: A classification of learning objectives educators set for students in order to create a more holistic education, with emphasis on cognitive, affective, and psychomotor domains (Bloom, Engelhart, Furst, Hill, & Krathwohl, 1956).

Anderson & Krathwol's Revised Taxonomy: A 2001 revision of Bloom's Taxonomy to define and delineate the Knowledge Dimension of learning's relationship to the Cognitive Process of learning (Anderson, Krathwohl, & Bloom, 2001).

Heer Combined Taxonomy Model: A model of taxonomy defining learning objectives exhibited by students when the cognitive process level of learning intersects with the knowledge dimension of learning (Heer, 2012).

CA VAPA Standards (California Visual and Performing Arts Standards): A framework of standards adopted by the California State Board of Education for visual and performing arts (CDE, VAPA, 2001).

CCSS (Common Core State Standards): The framework of core conceptual understandings and procedures communicating what is expected of students at each grade level, in each subject (Common Core State Standards, 2010).

National Core Arts Standards: The framework of core concepts, philosophies, structures, and outcomes for student achievement in Visual and Performing Arts (State Education Agency Directors of Arts Education, 2014).

Visual Literacy: The five stage scale developed by Abigail Housen and Philip Yenawine upon which people experiencing works of art can be ranked according to their levels of response, appreciation, and interaction with the work of art. (Housen , 2007)

Stage Descriptions are quoted directly from Housen's descriptions, as follows:

Stage 1: Accountive: Accountive viewers are storytellers. Using their senses, memories, and personal associations, they make concrete observations about a work of art that are woven into a narrative. Here, judgments are based on

what is known and what is liked. Emotions color viewers' comments, as they seem to enter the work of art and become part of its unfolding narrative.

Stage 2: Constructive: Constructive viewers set about building a framework for looking at works of art, using the most logical and accessible tools: their own perceptions, their knowledge of the natural world, and the values of their social, moral and conventional world. If the work does not look the way it is supposed to, if craft, skill, technique, hard work, utility, and function are not evident, or if the subject seems inappropriate, then these viewers judge the work to be weird, lacking, or of no value. Their sense of what is realistic is the standard often applied to determine value. As emotions begin to go underground, these viewers begin to distance themselves from the work of art.

Stage 3: Classifying: Classifying viewers adopt the analytical and critical stance of the art historian. They want to identify the work as to place, school, style, time and provenance. They decode the work using their library of facts and figures which they are ready and eager to expand. This viewer believes that properly categorized, the work of art's meaning and message can be explained and rationalized.

Stage 4: Interpretive: Interpretive viewers seek a personal encounter with a work of art. Exploring the work, letting its meaning slowly unfold, they appreciate subtleties of line and shape and color. Now critical skills are put in the service of feelings and intuitions as these viewers let underlying meanings of the work what it symbolizes emerge. Each new encounter with a work of art presents a chance for new comparisons, insights, and experiences. Knowing that the work

of art's identity and value are subject to reinterpretation, these viewers see their own processes subject to chance and change.

Stage 5: Re-Creative: Re-creative viewers, having a long history of viewing and reflecting about works of art, now willingly suspend disbelief. A familiar painting is like an old friend who is known intimately, yet full of surprise, deserving attention on a daily level but also existing on an elevated plane. As in all important friendships, time is a key ingredient, allowing Stage 5 viewers to know the ecology of a work — its time, its history, its questions, its travels, its intricacies. Drawing on their own history with one work in particular, and with viewing in general, these viewers combine personal contemplation with views that broadly encompass universal concerns. Here, memory infuses the landscape of the painting, intricately combining the personal and the universal. (p. 173)

Assumptions and Limitations

This initial experimental research specifically addresses the immediate concerns of the authors' inquiry: California Visual Arts Education in grades 7 to 12, with focus on the California State Standards and the implementation of the recently released National Core Arts Standards (NCAS, 2014). The initial experimental research focuses on the impact of these methods of assessment on measured creativity as demonstrated in student work.

For the purpose of this study, it was assumed that the Expert Panel Posttest Only Experiment instrument would be finalized consensually just prior to creativity assessment by the expert panel primarily to elicit a creativity rating scale that was contextual to the task of the student art projects (posttest artworks).

Furthermore it was assumed that teacher perceptions of demonstrated creativity were equally valuable as data to be examined in determining creativity in the Creativity Pretest/Posttest Gains Experiment.

The design chosen for the Expert Panel Posttest Only Experiment was the Quasi-Experimental Non-Randomized Posttest Only Design (Campbell & Stanley, 1963). The design chosen for the Pretest/Posttest Gains Experiment was the Nonrandomized Pretest-Posttest Design (Van Dalen & Meyer, 1979).

Despite the fact that randomization of subject selection would offer a more accurate experimental control, this author chose non-randomization through the use of intact classes for experimental and control groups. The main reasons for this decision are:

1. Site administrator's reluctance in disrupting school schedules (Van Dalen & Meyer, 1979); and
2. The use of intact classes is more suitable when one of the priorities of the study is the subjects' unawareness of the experiment (Van Dalen, Meyer & 1979).

Student posttest project samples (n) were effected by omitted samples. Some student posttest work that had been judged by the panelists had been very recently completed and was still in a "green ware" state, the un-fired clay that is very fragile, and still malleable if it is at all wet. Green ware when dry is extremely fragile, and easily broken. Project explosions in the kiln during firing throughout the last week of the treatment lesson due to inclimate weather and other unforeseen circumstances had negatively affected the quantity of projects in both the control group and experimental group results sample. In two separate kiln firings, a student had left tarpaper on their

green ware project, and covered the tarpaper with clay to hide the remaining tarpaper. It is suspected that in these two kiln firings, the green ware with tarpaper emitted steam and exploded, in such a way that the exploded shrapnel broke many nearby projects in the kiln.

In spite of the setbacks, students felt compelled to participate in the panel gallery showing, and had rushed to create last-minute green ware for inclusion into the gallery exhibit for the expert panelists. The expert panel rated the green ware, but the data collected from the green ware was omitted from the results for this initial experimental research. The data for the Expert Panel Posttest Only Experiment reflects the absence of these omitted works.

It was decided that despite the study's limitations, and due to the potential importance in the field of Art Education, this study should be conducted as an initial experimental study, which will offer insights for continued research.

CHAPTER 2

REVIEW OF LITERATURE

Introduction

The purpose of this literature review is to examine relevant studies pertaining to Quantitative Data-Driven Instruction and Assessment, qualitative Authentic Assessment particular to the pedagogy and assessment in visual arts education. It will be demonstrated how the proposed research is related to previous investigations, and how it can make a unique contribution in the field of Art Education. This chapter will follow a sequential structure--from comprehensive to specific--with divisions identified with the following headings:

A: *Assessment of Creativity.* --This section will provide information based on recent studies pertaining to the nature of Creativity as it pertains to the Visual Arts, and the assessment of creativity. Focus will be placed upon the benefits and limitations of creativity, and how one can appropriately assess creativity within the Visual Arts.

B: *Authentic Assessment.* --This section will provide information based on recent studies pertaining to the nature of authentic assessment, relevant to Art Education and particular to the visual arts. Divergent thinking will be discussed. Focus will be placed upon the benefits and limitations of this style of pedagogy and assessment, and the relevant value of the data that is collected.

C: *Quantitative Data-Driven Instruction and Assessment.* --This section will provide information based on recent studies pertaining to the nature of Quantitative Data-Driven Instruction and Assessment. Convergent thinking will be discussed. Focus will be placed upon the benefits and limitations of this style of pedagogy and assessment, and the relevant value to educators and students of the data that is collected.

Preface: The Purpose of Creativity in Arts Education, Specific to this Study

One of the most important outcomes of an education with art includes encouraging "creativity and innovative thinking in young minds" (Dwyer, PCAH, 2011 p. 8). Creativity as an applied skill in employees has been named as highly desired by employers, surpassing the importance of basic knowledge and ranking in the top five of applied skills (Ruppert, 2010). It is important to acknowledge that Art Education does not hold the monopoly on teaching creativity within the schools. However, it is one of the core academic subjects where the success of the art program is continually approved or condemned by the creativity of the curriculum, and the creativity of the student work produced, or the end product. Art Education curricula regularly use creativity as a vehicle with which to acquire and practice the higher-order thinking skills and communication skills, which educational reformers strive for students to aspire (NAEP, 2008). Therefore, not only is creativity a large part of the Art Education end product, it is integral to the process of making, and also to the pedagogy and curriculum. Due to the nature of the field of Art Education's symbiotic relationship with creativity, with the recognition that creativity is a major part of what students aspire to practice and demonstrate in a Visual Arts course, the author posits that it is essential to this study to

investigate creativity and its relationship to Visual Arts pedagogical and assessment methodologies.

Assessment of Creativity

Through an examination of recent literature pertaining to creativity, this section will provide information pertaining to the nature of creativity, specific to the assessment of creativity, with a focus particular to the process and products in the visual arts in secondary schools.

It is important to recognize the breadth of scope in the field of creativity research, as psychological research, as neurocognitive research, as systems analysis and work flow research, and as personal trait or discipline habit. Presently, over 100 definitions of creativity have been documented from literature and research (Treffinger, 2002). For the purposes of this study, which are very specific, the definitions agreed upon and utilized for this research will be the ones most recognized within the field of Art Education, for the purpose of education within the Visual Arts classroom and evaluation of assessment techniques for their suitability of use in the Visual Arts classroom.

Although much of the research in the field of creativity focuses on personal traits and divergent thinking, creativity is used in this study as an outcome that is to be measured in process and product, assisting in determining of the suitability of implementing Quantitative Data-Driven Assessment in Visual Arts assessment processes.

Mihaly Csikszentmihalyi clearly characterizes creativity as a social process across the three related components defining creativity: domain, field, and individual. Csikszentmihalyi defines creativity as "an act, idea, or product that changes an existing domain, or that transforms an existing domain into a new one" (Csikszentmihalyi, 1996,

p. 28). Creativity affects a domain when the creative response alters the set of rules, symbols, and procedures that govern the domain. Examples of a domain would be mathematics or biology, or pertinent to this experimental research, the domain would be art.

Within the domain is the field, the people acting as "gatekeepers" decide which changes to the domain will be included or rejected. Within the field are the individuals, the people identifying or generating the novelty selected by the field to be included in the domain. "A domain cannot be changed without the explicit or expressed consent of a field responsible for it" (Csikszentmihalyi, 1996, p. 28). For the purpose of this experimental research, the author finds it important to include other appropriate observers within the field of Art Education in the assessment of creativity. The field of "gatekeepers" employed is an expert panel of art educators within the district of the experiment sites. The expert panel will be explained in further detail in Chapter 3.

Teresa Amabile (1983, 1996) continues Csikszentmihalyi's inquiry into the nature of creativity, also recognizing that creativity cannot be defined nor experienced by the individual alone. Amabile develops two ways to define creativity: Contextually and Consensually.

In Contextual Creativity, the end product is evaluated for creativity as well as the process of creating the end product. A product or response is judged as creative "to the extent that (a) it is both a novel and appropriate, useful, correct or valuable response to the task at hand, and (b) the task is heuristic rather than algorithmic" (Amabile, 1983, p. 358). It is within the context of the task that creativity is judged as useful, valuable, or

novel, and the process of creating the end product is as equally valued as the end product is.

The task must be a heuristic one, though.

The conceptual definition of creativity states that a creative response is a novel and appropriate solution to a heuristic task. If the path to solution is clear and straightforward, the task is an algorithmic one, and responses to it simply cannot be considered creative. To allow responses that may be considered creative, the task must be open-ended to some degree. Some search for solution paths is required.

Raymond Veon agrees that the skills identified as integral to creativity are non-algorithmic and based in uncertainty. This complexity and uncertainty when "not everything that bears on the task at hand is known" develop and exercise the metacognitive skills of higher-order thinking (Veon, 2014b). We do not assert higher order thinking in someone when someone else directs the task at every step (Goldstein & Ford, 2001). For the purpose of this initial experimental research, the experimenter finds it important to keep the tasks of the instrument as heuristic as can be practically accomplished.

Judging creativity consensually is much like that of an art critique in which the process is as important as the finished product. Amabile asserts that "appropriate observers are those familiar with the domain in which the product was created or the response articulated. Thus, creativity can be regarded as the quality of product or responses judged to be creative by appropriate observers, and it can also be regarded as the process by which something so judged is produced" (1983, p. 357). "A product or

response is creative to the extent that appropriate observers independently agree it is creative"(Amabile, 1983, p. 357).

Because creativity occurs in a social context, researchers agree that some of the evaluation of creativity needs to be done within this context (Csikszentmihalyi, 1999; Terry & Mynatt, 2002; Terry, Mynatt, Nakakoji & Yamamoto, 2004). Amabile (1983, 1996) recognizes the importance of judging creativity by the process and product, and also within the community of appropriate observers familiar with the domain. For the purposes of this initial experimental research, the experimenter will follow Amabile's recommendations on testing hypotheses about creativity: "the task (1) is an open-ended (heuristic) one; (2) does not depend heavily on special skills; and (3) is one in which subjects actually make an observable product or a response that can be recorded and later judged on creativity" (1983, p. 359).

Authentic Assessment

This section will provide information based on recent studies relevant to the nature of qualitative authentic assessment in Art Education, particular to the visual arts. Divergent thinking will be discussed. Focus will be placed upon the benefits and limitations of this style of pedagogy and assessment, and the value of the data that is collected.

Authentic Assessment is a the "examination of student performance on worthy intellectual tasks. Traditional assessment … relies on indirect or proxy 'items'--efficient, simplistic substitutes from which we think valid inferences can be made about the student's performance at those valued challenges" (Wiggins, 1990) It is a qualitative style of assessment used throughout Art Education, including in the Visual Arts, including the

measurement of "intellectual accomplishments that are worthwhile, significant, and meaningful, as compared to multiple choice standardized tests" (Wehlage, et al., 1996, p. 23). Grant Wiggins characterizes the designs and uses of assessments as authentic when the following characteristics are present (Wiggins, 1990):

(1) Acquired knowledge is effectively performed by students.

(2) A full array of tasks performed by student's mirrors the best instructional practices.

(3) Student can craft polished, thorough and justifiable answers, performances or products.

(4) Involve 'ill-structured' challenges and roles" reflecting the "complex ambiguities" applied domain scenarios.

(5) Enabling and forward-looking, not just reflective of prior teaching. (p. 3)

In Authentic Assessment, it is sufficient to present with some or most of the characteristics to be considered as authentic. Lack of one or more of the vital characteristics will not invalidate the process of authentic assessment.

Wiggins (1990) further states of Authentic Assessment the benefits such as the teacher-mediated assessment itself is easily shareable and open to public examination. In the utilization of Authentic Assessment, essential intellectual abilities and habits of mind are prioritized over the achievement of one singular answer. Edward Chittenden (1991) continues that Authentic Assessment capitalizes on the actual work done within the classroom, negating some of the need for additional or quantitative assessments, enhancing student and teacher cooperative involvement in evaluation.

Howard Gardener and Reinecke Zessoules (1990) explain that the authentic assessment is an ongoing process where the teacher monitors students' expressions of thoughtfulness, being creative, curiosity, and self-directed independence. Students are able to make use of a variety of skills they have learned in a variety of contexts. The Authentic Assessment process employs divergent thinking in which many possible correct solutions can be employed to demonstrate understanding. Divergent thinking is the idea-generating process in which many unexpected connections are drawn. Convergent thinking is the process of narrowing and organizing these ideas, into a structured closure.

Limitations to Authentic Assessment include that the process is labor-intensive and time-intensive. If assessed nationally or on a larger scale than the immediate locale, the cost of Authentic Assessment can be considerable in comparison to older methods of standardized assessment. (In the 1990 Article, Gardener and Zessoules cite an estimated cost of $2.00 per student for Authentic Assessment, compared to mere cents per student using standardized testing. However, it is worth noting that the cost comparison now in 2015 would demonstrate little to no difference per student, especially taking into consideration the start-up and maintenance costs of hardware, software, and Internet access capabilities for test administration. These costs are repeated every few years as upgrades and technological accommodations are required.) The suggestion to utilize sampling with Authentic Assessment in a larger scale assessment is raised by Wiggins (1990) to ameliorate the costs of a national scale Authentic Assessment within a domain.

Gardener and Zessoules (1990) illustrate the comparison of Authentic Assessment with the administration of the Grade 4 Manipulative Skills Test in New York State. In a

traditional standardized test, students would be required to demonstrate possession of facts, and recitations of knowledge. The Manipulative Skills Test, an authentic assessment, requires a hands-on demonstration of understanding, and a practical application of domain-based skills. The Authentic Assessment is a reflective and cyclical practice of how to think and work in the individual role, within the community of the domain.

Both intrinsic motivations and extrinsic motivations are employed in Authentic Assessment, as the teacher is continually a reflective practitioner, and student is an active participant in the assessment (Zessoules, Gardener, 1990). Numerous studies have found that students who are intrinsically motivated to persist longer, conquer more challenges, and demonstrate accomplishments in their academic endeavors than those who are extrinsically motivated (Pintrich & Garcia, 1991).

Quantitative Data-Driven Instruction and Assessment

Through an examination of recent literature this section will provide information pertaining to the quantitative nature of Data-Driven Instruction and Assessment. Focus will be placed upon the benefits and limitations of this style of pedagogy and assessment, and the value of the quantitative data that is collected specific to its employment as a tool for use within the visual arts classroom.

Data-Driven Instruction in classrooms has become a widely utilized method of assessment of student achievement. Data-Driven Instruction is a pedagogical system with the overall purpose of aligning the assessments of student achievement to the curriculum. Focus is placed primarily on the assessments, secondarily on the instruction, in order to improve student achievement scores. (Bambrick-Santoyo, 2010; Mertler,

2014; Sindelar, 2010). "The practices of Data-Driven Instruction are inextricably bound up with the process of assessment." (Bambrick-Santoyo, 2010, loc. 647) "After we align our local curriculum and assessments to standards, we experience a gradual shift in our understanding and use of assessment." (Sindelar, 2010, loc. 339)

Citing the disconnect between curriculum and assessment, proponents of Data-Driven Instruction state that the most important tenet of Data-Driven Instruction and Assessment is to design standards-based assessments first, then plan the curriculum backward to support achievement on the tests. "We use our quizzes and unit tests as assessments for learning rather than assessments of learning. Rather than just putting another grade in the grade book, we analyze test results, diagnose learning difficulties, and identify the next steps we need to take to remediate our students' weaknesses." (Sindelar, 2010, loc. 340).

In quantitative Data-Driven Instruction and Assessment, students take formative and summative assessments that are aligned to specific academic standards (state or national standards in the pre-Common Core era, or now the Common Core State Standards). The assessments are designed to be closely representative of content that is on state and national standardized achievement tests. When curriculum is separated from assessment, then assessment results will not fairly reflect what has been taught. "If the curriculum scope and sequence do not precisely match the standards on the interim assessments, then teachers will be teaching one thing, and assessing something else altogether. Then any assessment results have no bearing on what actually happens in the classroom" (Bambrick-Santoyo, 2010, loc. 465).

Test structures and questions are designed by the teacher, test designer, or textbook publisher to represent student mastery of the designated content standards.

> "When defining your learning targets, you need to have whatever standards you want your students to learn close at hand. It's also a good idea to review state test data for your school to determine standards that are 'key' based on difficulty and number of test items, as well as to identify areas where students' scores are low" (Sindelar, 2010, loc. 423).

Data-driven tests are mostly quantitative in nature using only true/false, multiple-choice, and scored rubrics to assess student mastery of standards. The data driven software collects scoring data by using an optical scanner to record student test answers recorded within a bubble-style answer document. The software compiles score data, and reports results to educators, administrators, students, and parents the level of mastery of that standard attained by students at the time of the test.

Data-Driven Instruction and Assessment allows this data to be shared among all stakeholders; teachers, students, parents, administrators, and so forth. The immediate, quantitative feedback provides educators with the opportunity to group low performers by content area or standard, and to design and provide targeted student interventions. Pedagogical shifts can be made after a teacher reflection of what the report of student scores demonstrates. If implemented by the teacher with an opportunity for error analysis by the students, students can reflect on their own mastery of content standards, reconsidering patterns of thought that may have led to the initial errors specific to the content standard. Longitudinal score data can be an opportunity for student reflection on their own progress of standards mastery.

The limitations of quantitative Data-Driven Assessment occur frequently enough that even the proponents of this assessment pedagogy predict failure of the system if all ideal conditions are not successfully met at all times. Lack of one or more of the vital characteristics will invalidate the process of Data-Driven Assessment. If the interim assessments are less frequent than every six-to-eight weeks, if the results are delayed more than forty-eight hours from the assessment administration, if teachers are not provided time by the school for a quality data analysis, if teaching and analysis are separated, and there is a disconnect between curriculum and assessment, the entire system is unreliable and the data is worthless. (Bambrick-Santoyo, 2010) "Making sweeping, important decisions about students or instruction on the basis of limited sets of data" (Russell & Airasian, 2012 in Mertler, 2014, loc. 45) can result in over-interpretation of the quantitative results leading also to errors in the system. Craig Mertler also describes a loss of longitudinal focus with the over-use of Data-Driven Assessment, "if your engagement in these processes progresses across multiple years, it will likely become increasingly difficult to keep track of where you have been and to map out where you might be headed" (2014, loc. 286).

When utilized correctly, this quantitative true/false, Multiple Choice, or scored rubric analysis employed in quantitative Data-Driven Instruction and Assessment seems appropriate for employment in content areas that are quantitative and convergent by nature; where there is usually only one right answer to attain. The score reflects the students' answer was either correct or incorrect. According to the data collected, it is assumed that the student either mastered the content standard linked to that test question or did not.

> "In addition to informing instructional practice, the use of software creates ease and efficiency for teachers because tests are scored and analyzed in minutes, and hand scoring and tallying of test results, which often takes hours of teacher time, are eliminated" (Sindelar, 2010, loc. 261).

The value of quantitative date for collection and use within the Visual Arts curriculum is at times extraneous to determine learning in qualitatively assessed and divergent subjects, such as the Visual Arts. Proponents of qualitative Data-Driven Assessment support the inclusion of qualitative data with which to score students quantitatively. The use of standards-based rubrics, formative assessments including teacher observations, student responses and reflections, summative assessments including portfolios, performance-based assessments are encouraged as "legitimate and viable sources of student data for this process". (Mertler, 2014, loc. 37) "in the end, both interim assessments and in-the-moment assessments are necessary and important." (Bambrick-Santoyo, 2010, loc. 2780).

Some quantitative Data-Driven Assessment proponents even contradict their own findings of the value of qualitative data for use in Data-Driven Assessment.

> "Because of vocabulary and value-laden questions, some traditional assessment tools may greatly underestimate the knowledge a student possesses. The results of performance assessments tend to be more indicative of students' actual understanding of a concept or a skill, while forced-choice, short constructed-response tests may provide a less valid data." (Almeida, 2007, in Sindelar, 2010, loc. 1343)

> "Performance assessments, such as rubric-graded projects, labs, speeches, and performances, all do a better job of assessing content knowledge rather than content knowledge and the ability to communicate it in Standard English. When these assessments include tools or artifacts that are used in a student's everyday life, the assessment's ability to capture a student's understanding of a concept or a problem is also increased." (Edd Taylor, in Beck, 2009, p. 94)

It is worthwhile to note that extrinsic motivations are employed in Quantitative Data-Driven Assessment. Numerous studies have found that students motivated extrinsically tend to focus on earning higher grades, obtaining rewards and acceptance from peers (Pintrich & Garcia, 1991). Some researchers have also posited that extrinsic motivational factors can diminish students' intrinsic motivation (Biehler & Snowman, 1990). If the ambition of the assessment is to increase student learning, beyond the immediacy of the assessment, consideration of the type of assessment and its' motivation is entirely appropriate.

The employment of standards-based rubrics is again prescribed as the bridge to assess quantitatively a qualitative and divergent domain. The use of the standards-based curricula and assessment promote the idea that students will learn the same information, and be assessed consistently by different raters over time (Sindelar, 2010).

Summary And Conclusions

The conclusions of this review of literature are divided into three major headings:

1. Assessment of Creativity
2. Authentic Assessment
3. Quantitative Data-Driven Instruction and Assessment

Assessment of Creativity Summary and Conclusions

This section provided the reader with a basic understanding of recent studies on the nature of assessing creativity, relevant to Art Education, specific to the visual arts. Creativity is heuristic, not algorithmic. Creativity is a social process that is defined in a multi-faceted method. Assessment of creativity naturally follows a multi-faceted approach. Creativity properly assessed will be done at the individual level, and also at the field "gatekeeper" level, within the context of the task and within the context of the domain. Process and product are equally weighted in importance when considering assessment of creativity.

Authentic Assessment Summary and Conclusions

This section provided the reader with a basic understanding of recent studies on the nature of Authentic Assessment, relevant to Art Education, specific to the visual arts. Literature indicates Authentic Assessment to be more indicative of intellectual abilities and demonstration of understandings. The underlying principles are that the habits of mind and essential abilities of the student are prioritized over a recitation of knowledge. Divergent thinking is practiced and encouraged. Uncertainty is necessary. Absence of one characteristic of Authentic Assessment does not negate the validity of the system.

Quantitative Data-Driven Instruction and Assessment Summary and Conclusions

This section provided the reader with a basic understanding of recent studies on the nature of quantitative Data-Driven Instruction and Assessment. Literature indicates Quantitative Data-Driven Assessment a valuable instrument in improving student achievement scores. Assessment is prioritized with all curricular matters aligned to the assessment, with the presence content on state and national standardized tests preferred to

that which is not. Alignment of the content to the test is key. Convergent thinking is practiced and encouraged. Qualitative assessment practices are prevailing. Absence of merely one of the characteristics negates the reliability of the entire system.

Based on what has been covered in this review of literature, the experimenter draws three essential conclusions:

1. The appropriateness of employment of Quantitative Data-Driven Assessment in the Visual Arts curricula has not been tested. Although employment of Quantitative Data-Driven Assessment has been initiated in some school settings, further research in this area is needed.

2. Extrinsic and Intrinsic motivations can impact student achievement specifically to the extent to which students are assessed qualitatively or quantitatively. It is entirely worthwhile to examine the motivations employed when examining the appropriateness of an assessment. Further research in the area of assessment motivation is needed.

3. Creativity as a process and product is a valuable outcome of a Visual Arts curriculum. The overall reticence from the field of Art Education to affirm and declare this value is reflective of the former difficulties and ambiguities in defining creativity, and how to assess it. Recent analyses in scholarly literature prove that assessment of creativity can be performed. With the renewal of educational purposes and aims, including the implementation of the National Arts Standards, and electively adopted Common Core Standards in Math and Language Arts, an opportunity arises to incorporate creativity as an equally important process and product that can be assessed and encouraged. While the

Visual Arts hold no monopoly over the encouragement of creativity, as previously stated, the demonstration of creativity is part and parcel of what Art Educators do, and how we are judged as effective educators.

There is clear evidence that further research in the area of the appropriateness of quantitative assessment in qualitative subjects is needed. This study proposes to contribute to the literature on an assessment's effect upon demonstrated creativity, relevant to Art Education, and specific to the Visual Arts.

CHAPTER 3

METHODOLOGY

From the previous review of the literature, two experiments were developed to measure an assessment's motivational impact on creativity of student art projects. Instrument A for the first experiment is the Expert Panel Posttest Only Experiment. Instrument B for the second experiment is the Creativity Pretest/Posttest Gains Experiment. The methods of assessment, referred to here as Authentic Assessment, and Quantitative Data-Driven Assessment (QDDA), represent the independent variable in both initial experiments.

In both initial experiments the dependent variable is the posttest assessment motivation presented to students. The control group using Authentic Assessment was presented with the motivation of "increasing creativity" from pretest to posttest. The experimental group using Quantitative Data-Driven Assessment were presented with the motivation of "increasing creativity scores" from pretest to post test. The Lesson Plans, three Discussion Boards, Pretest and Posttest Evaluation Rubrics, and assessment rubrics were identical between control group using Authentic Assessment and experimental group using QDDA. Only the posttest assessment motivation differed between groups.

Instrument A: Expert Panel Posttest Only Experiment Hypothesis

The first experiment is a quasi-experimental posttest-only design (Campbell & Stanley, 1963). In the first experiment referred to as the Expert Panel Posttest Only

Experiment, an independent panel of appropriate expert observers whom are familiar with the task formed a consensual definition of creativity. The expert panel uses their consensually defined creativity criteria to judge student posttest-only artworks for creativity. Expert panel judges have reviewed recent and relevant scholarly literature about creativity narrowed specifically to the context of Art Education. Expert panel judges have reviewed all student lesson information including the three Discussion Boards, Pretest and Posttest Evaluation Rubrics, Lesson Plans, a Student-Generated Creativity Rubric, and visual reference materials. Images of student pretest projects were made available as requested by the expert panel.

The expert panel's consensual creativity agreement was defined using four criteria, which subsequently constituted and defined the following four hypotheses:

Hypothesis 1: It is hypothesized that an analysis of variance (ANOVA) will determine a statistically significant difference in creativity between the control group utilizing Authentic Assessment and experimental group utilizing Quantitative Data-Driven Assessment (QDDA) posttest only artworks in the consensually panel-defined "Work Synthesizes Ideas in Original and Surprising Ways" with experimental group utilizing QDDA demonstrating significantly lower creativity scores in this category.

Hypothesis 2: It is hypothesized that an analysis of variance (ANOVA) will determine a statistically significant difference in creativity between the control group utilizing Authentic Assessment and experimental group utilizing Quantitative Data-Driven Assessment (QDDA) in the consensually panel defined "Novel or Valuable Response to the Task" with experimental group utilizing QDDA demonstrating significantly lower creativity scores in this category.

Hypothesis 3: It is hypothesized that an analysis of variance (ANOVA) will determine there will be a statistically significant difference in creativity between the control group utilizing Authentic Assessment and experimental group utilizing Quantitative Data-Driven Assessment (QDDA) in the consensually panel defined "Work Is Improved from Pretest to Posttest" with experimental group utilizing QDDA demonstrating significantly lower creativity scores in this category.

Hypothesis 4: It is hypothesized that an analysis of variance (ANOVA) will determine there will be a statistically significant difference in creativity between the control group utilizing Authentic Assessment and experimental group utilizing Quantitative Data-Driven Assessment (QDDA) in the consensually panel defined "Work Is Original from Others in the Class" with experimental group utilizing QDDA demonstrating significantly lower creativity scores in this category.

Instrument B: Creativity Pretest/Posttest Gains Experiment Hypothesis

The second experiment is a measurement of gains in creativity scores from pretest projects and posttest projects using data from Teacher Evaluations on the creativity rubric.

A unit of instruction in Ceramics specifically creating Tar-Paper Slab Projects was delivered. The control group received the Authentic Assessment, and the experimental group received the Quantitative Data-Driven Assessment (QDDA). In both initial experiments the dependent variable is the posttest assessment motivation presented to students. The control group using Authentic Assessment was presented with the motivation of "increasing creativity" from pretest to posttest. The experimental group using QDDA were presented with the motivation of "increasing creativity scores" from

pretest to posttest. The Lesson Plans, three Discussion Boards, Pretest and Posttest Evaluation Rubrics, and assessment rubrics were identical between control group using Authentic Assessment and experimental group using QDDA. Only the posttest assessment motivation differed between groups. Results were then compared for gains in creativity with pretest-posttest data from Teacher Evaluations.

The initial experimental research pretest/posttest gains experiment tested the following four hypotheses in order to determine the impact of a method of assessment on creativity gains between the control group using Authentic Assessment and the experimental group using QDDA.

Hypothesis 5: It is hypothesized that an analysis of variance (ANOVA) will determine there will be significant decrease in creativity in the experimental group utilizing Quantitative Data-Driven Assessment (QDDA) from pretest to posttest demonstrated in Teacher Evaluations in the creativity category "Synthesis of Ideas In Original and Surprising Ways".

Hypothesis 6: It is hypothesized that an analysis of variance (ANOVA) will determine there will be significant decrease in creativity in the experimental group utilizing Quantitative Data-Driven Assessment (QDDA) from pretest to posttest demonstrated in Teacher Evaluations in the creativity category "Novel or Valuable Response to the Task".

Hypothesis 7: It is hypothesized that an analysis of variance (ANOVA) will determine there will be significant decrease in creativity in the experimental group utilizing Quantitative Data-Driven Assessment (QDDA) from pretest to posttest

demonstrated in Teacher Evaluations in the creativity category "Work Makes Student Ask New Questions to Build Upon An Idea".

Hypothesis 8: It is hypothesized that an analysis of variance (ANOVA) will determine there will be significant decrease in creativity in the experimental group utilizing Quantitative Data-Driven Assessment (QDDA) from pretest to posttest demonstrated in Teacher Evaluations in the creativity category "Enables Student To Discover, Learn Something Not Directly Instructed".

Research Procedure

Test Groups

One control group and one experimental group were employed in this initial experimental research. The control group was exposed to Authentic Assessment, and the experimental group was exposed to the Quantitative Data-Driven Assessment (QDDA). Both treatments will be explained in detail later in this chapter.

Population and Sample

At the time of this initial experiment, data on this school is continually evolving due to the growth and development of a new school in an established district. The student data at this school site is mostly a reflective population sample of the district under which it operates. The district educates a diverse population of more than 30,000 K-12 students in twenty-four elementary schools, six middle schools, four high schools and two alternative education sites. As of the 2014-2015 academic year, the district has fifteen Federally designated "Title I" schools, one of which is the site of this initial experimental research, Jeffrey Trail Middle School. The district boasts nationally recognized schools as student performance is well-above state and national comparisons;

and maintains comprehensive programs in academics, the arts, and athletics. Approximately 12,260 students, or nearly 39 percent of students in the district have a native language other than English. Common native languages of students within the school district include Arabic, Chinese, Farsi, Japanese, Korean, and Spanish. (IUSD, 2015) More than 5,300 students, or about 17 percent of students in the district are limited in their English proficiency.

This initial experimental research took place in the fall of 2014 at Jeffrey Trail Middle School located in Irvine, California. The school site for this initial experimental research is a middle school in its second year of operation, with 981 students enrolled. 445 of the students are 7th grade, and 536 are in the 8th grade. Jeffrey Trail has received US Federal "Title I" designation.

At the school site, only 71 7th grade students, and 50 8th grade students are labeled as English Language Learners. However, the district has in place a Newcomer Program for English Language Learners scoring low on CELDT placement tests. The Newcomers are taught with special support in their home language at a separate school site, making the site data at Jeffrey Trail Middle School for English Language Learners an inaccurate representation of the overall district population. Students who have scored low in the CELDT placement test still attending Jeffrey Trail Middle School without language support do so voluntarily, legally waiving their rights to language support for instruction (IUSD, 2014).

The district offers access to Visual Art courses at the Middle School level, and an introduction of Art experiences at the Elementary School levels led by Art Educators at least six hours of instruction, per academic year in grades 4, 5, and 6. Art programs

increase in variety and availability at the high school level and include Drawing, Painting, Ceramics, Graphic Arts, Digital Media, Animation, Metals and Jewelry Design. It is worthwhile to note that this district also has a large performing arts program with theater, dance, and music at all grade levels, having earned the distinction of one of the "Best Communities for Music Education" by the NAMM Foundation in 2014, 2013 and 2010. The Grammy Foundation has also awarded Irvine Unified School District high schools ten Grammy Signature Awards, currently leading all other districts in California (IUSD, 2014).

Permission to conduct this initial experimental research was granted by the Jeffrey Trail Middle School Principal with the condition that instruction provided is part of the regular "8th Grade Art" curriculum. In this way there could be no interruption of student schedules and of the regular art program. This condition was a major determinant for choosing intact classes as experimental and control groups for this initial experimental research rather than a randomized selection of students.

The student subjects for the experiments were enrolled in two separate sections of 8th grade Art class. These sections constituted both the control and experimental groups. Period 1 constituted the control group, using Authentic Assessment. Period 6 constituted the experimental group, employing the Quantitative Data-Driven Assessment. Student populations for both experimental and control groups were surveyed regarding their experience in the Visual Arts. Of the seventy-three students polled in this study total, sixty responded to the survey. Of all student respondents, thirty-five percent report never have taken an Art class in school before the implementation of this initial experimental research. Forty-eight percent of respondents have not taken Art courses outside of school

prior to the survey. The results of the survey are significant due to the recent population changes to the district, with many students and families as recent immigrants to the area from various international communities, with a variety of experience of and personal or cultural investment in Art Education.

The Design

Two initial experiments were conducted in a middle school Visual Arts classroom with 8th grade students. Due to the practical considerations of conducting pilot studies in which one mode of assessment was compared with another mode of assessment, randomization of the population was not possible, nor practical.

In Instrument A, an analysis of student creativity was performed by an expert panel of art educators, whom had reached a consensual definition of creativity, then had rated student art work on the consensually defined rubric of creativity.

Instrument B is a comparative analysis of gains in student creativity made through a difference in scores recorded in pretest and posttest. The rubric to score for creativity relied upon a contextual definition of creativity.

Instruments

The two instruments designed for this study had two main purposes.

1. Instrument A is a comparison between groups of student creativity demonstrated in student art work as determined by appropriate observers, an expert panel of art educators within the district of the student population. A quantitative analysis of student creativity was determined by a professional panel of art educators within the district of the student population. The rubric to score for creativity relied upon a contextual definition of creativity.

2. Instrument B is a comparison between control and experimental groups of decreases or gains in creativity as demonstrated in student artwork as measured by Teacher Evaluation from pretest to posttest. Assessments of student artwork are rubric-based utilizing multiple criterion to evaluate.

The two instruments were necessary for the purpose of this study due to the scholarly research and accepted definitions regarding creativity, specific to Art Education. Although over one hundred definitions of creativity currently exist, for the purposes of this experimental research in visual arts education, creativity is the experience of creating something new and valuable that transcends traditional ideas, rules, patterns, or relationships. The creation can be meaningful new ideas, forms, methods, interpretations, processes, or products. Creativity is defined within the context of the task, and by a consensus of appropriate observers. The products are considered creative when the task itself is heuristic, not algorithmic.

Independent, Dependent, and Controlled Variables

Two initial experiments were developed to measure an assessment's motivational impact on creativity of student art projects. Instrument A for the first experiment is the Expert Panel Posttest Only Experiment. Instrument B for the second experiment is the Creativity Pretest/Posttest Gains Experiment.

In both initial experiments the independent variable is the posttest assessment motivation presented to students. The control group using Authentic Assessment was presented with the motivation of "increasing creativity" from pretest to posttest. The experimental group using Quantitative Data-Driven Assessment were presented with the motivation of "increasing creativity scores" from pretest to post test.

The dependent variable in Instrument A; the Expert Panel Posttest Only Experiment is represented by the mean creativity scores, compared from control group using Authentic Assessment and the experimental group using Quantitative Data-Driven Assessment.

The dependent variable for Instrument B; the Creativity Pretest/Posttest Gains Experiment is the gain in mean creativity scores from Teacher Evaluation, compared from control group using Authentic Assessment and the experimental group using Quantitative Data-Driven Assessment.

The Lesson Plans, three Discussion Boards, Pretest and Posttest Evaluation Rubrics, and assessment rubrics represent the controlled variables, remaining identical between control group using Authentic Assessment and experimental group using Quantitative Data-Driven Assessment (QDDA). Only the posttest assessment motivation differed between groups.

Treatments

Two units of instruction were employed in this experiment:

1. The Tar Paper Slab Construction lesson, which was administered to both the control group and experimental group.
2. The Ceramics Surface Treatments lesson which was administered to both the control group and experimental group.

Over the course of the two units of instruction, three Discussion Boards were employed as complementary instruction to both the control group utilizing Authentic Assessment and the experimental group utilizing Quantitative Data-Driven Assessment.

1. Discussion Board A: “What is creativity?”

2. Discussion Board B: “What surface treatments are you considering?”

3. Discussion Board C: “List how you are going to make the second Tar-Paper Slab Project more creative than the first.”

Between the completing Discussion Board B and Discussion Board C, Students were asked to create a rubric to evaluate themselves on their own definition of creativity. The resultant rubric generated later became the “Student Generated Creativity Rubric”.

In the first experiment, Instrument A: Expert Panel Posttest Only Experiment, posttest student artwork was exhibited to an Expert Panel of appropriate observers (local Art Educators within the district of the initial experiment site). Control group works utilizing Authentic Assessment and experimental group works utilizing Quantitative Data-Driven Assessment were randomly assorted throughout the exhibit. The Expert Panel for creativity judged each posttest student artwork.

In the second experiment, Instrument B: Creativity Pretest/Posttest Gains Experiment, Pretest/Posttest creativity scores from Teacher Evaluations on the creativity rubric were recorded and compared between groups.

TABLE 3.1. Butler Experimental Research Methodology

ART EXPERIENCES SURVEY	
CONTROL GROUP: Authentic Assessment	EXPERIMENTAL GROUP: Quantitative Data-Driven Assessment
Lesson 1: Tar-Paper Slab Construction Ceramics Projects	
Discussion Board A: "What is Creativity?"	
Pretest Projects Completed, Students Self-Evaluation, Teacher Evaluation	
Lesson 2: Surface Treatments on Tar-Paper Slab Projects	
Discussion Board B: "Which Surface Treatments would you employ?"	
"Student-Generated Creativity Rubric" Discussion and Creation	
Discussion Board C: "List how you are going to make the second Tar-Paper Slab Project more creative than the first."	
CONTROL TREATMENT: Posttest Assessment Motivation "How can we increase our creativity?"	EXPERIMENTAL TREATMENT: Posttest Assessment Motivation "How can we increase our creativity scores according to the rubric?"
Pretest Projects Completed, Students Self-Evaluation, Teacher Evaluation	
INSTRUMENT A: EXPERT PANEL POSTTEST ONLY EXPERIMENT	
INSTRUMENT B: CREATIVITY PRETEST/POSTTEST GAINS EXPERIMENT	

Art Experience Survey Results

A survey about student experience with the Visual Arts was employed prior to the initial experimental research in order to select the most appropriate art medium to use for the unit of instruction in the treatment. Effective lessons in art require some difficulty to provide students a challenge, and a level of comfort and ease in order to avoid too much frustration (Bartel, M, 1999). Just as in all academic subjects, the skills specific to the medium are learned through practice. Bartle continues "The best lessons are those that include practice training together with interest builders that motivate self initiated skill practice." (1999, web). Due to these motivational influences, the author felt it necessary to select a medium in which interest was high and student experience was evenly balanced between the familiar and the strange.

In prior lessons both in control and in experimental groups students demonstrated polar abilities in drawing and painting. Some students demonstrated extraordinarily high levels of proficiency far above grade level expectations in drawing, or in painting. The other students were at or far below grade or developmental level in drawing and/or painting skills (Edwards, 1999; Lowenfeld, 1947; McGregor, 1990; Perry & Wolf, 1988).

Just as in most aspects of work and education, motivation has a direct influence on perception of ability. Students often present an attitude of incompetence in art because they feel untalented (Bartel, 1999) especially in comparison to peers with greater levels of skills practice. Choosing the most appropriate art medium to use for the unit of instruction in the treatment was essential for fair and authentic results for this initial experimental research. Drawing and Painting were both excluded as a potential medium

for this initial experimental research because of the disproportionate ability and experience reported from students.

Results from the pre-pilot-study survey indicate 65% responded that they have not taken Art classes in school prior to this course. Student response indicates 52% have taken Art classes outside of school including at Art Camp (5%), Private Art Tutoring (15%), Art Workshops (1%), and other.

Student respondents report their experience with types of art making according to media. 98% of respondents have made Drawings. 93% of respondents have made Paintings. 31% have practiced Printmaking. 50% of respondents report having made hand-built Ceramics projects, and 11% have experience with Ceramics in wheel throwing. 51% of respondents report experience in photography although most of these respondents report that use of their smartphone for photography qualified their perception of photography experience. 30% of student respondents report experience in making Graphic Arts and/or Graphic Design. 33% of student respondents report experience in creating hand-drawn Animations, and 15% report experience in digital Animations. 11% of respondents have experience in Filmmaking. 16% of respondents report experience in digital image manipulation (such as Photoshop, Illustrator, etc.) although again, most of these respondents report that use of their smartphone for this purpose qualified their perception of digital image manipulation experience. 41% of student respondents report experience with making Collage. 35% of students report experience in Sculpture, with 18% reporting experience in carving or building wood, and only 3% building or sculpting in metals. No student respondents report experience with Jewelry-Making of any type, and no respondents report experience with other not-listed options of art making.

63% of respondents have entered their art work in some sort of competition, with 51% of respondents have had their art work on display at a school art display, 21% displayed in a gallery, and 10% have displayed their work in an online gallery.

The majority of student respondents report either one year or three years experience in art making, in and outside of school, (13% for both). However, 23% of respondents report at least ten or more years experience in art making, in and outside of school. The majority of student respondents report that they have either not yet taken art classes in any form (28%), or they have taken 1 year cumulatively of art classes in any form (25%).

Student respondents demonstrate little to no experience in attending an art museum within the past five years. 28% of student respondents have never been to an art museum, 23% have attended an art museum once in the past five years, and 35% of student respondents have attended an art museum within the past five years. Similar results are reported regarding art gallery attendance. 31% of student respondents have never attended an art gallery, 30% of student respondents have attended an art gallery once in the past five years, and 26% of student respondents have attended an art gallery two to three times in the past five years.

Student respondents rated their perceptions of themselves as artistically skilled. 10% of student respondents report a perception of "not at all skilled". 15% of student respondents report a perception of having very little artistic skills. 43% of students perceive themselves as "o.k., not the best, but not the worst" in artistic skills. 26% report a comfort with their perception of artistic skills with a desire to still improve upon them,

and 6% of student respondents report a very confident perception of their artistic skills, perceiving themselves as one of the top five in their class.

The limitations of access to technology of some art media at the initial experimental research site at the time of the initial experimental research excluded the exploration of certain art media: Photography, Digital Photography, Graphic Art / Graphic Design, Digital Animation, and Digital Image Manipulation. Wood, Metals, Sculpture, and Collage were also precluded from consideration for employment in the initial experimental research due to site-specific concerns and limitations.

For the purposes of this initial experimental research, the experimenter will follow Teresa Amabile's recommendations on testing hypotheses about creativity: "the task (1) is an open-ended (heuristic) one; (2) does not depend heavily on special skills; and (3) is one in which subjects actually make an observable product or a response that can be recorded and later judged on creativity." (Amabile, 1983)

It was decided that the polarity of the results and skills practice experience for drawing and painting both precluded either medium from suitability for inclusion in the treatment of this initial experimental research. Hand-Building methods in the medium of Ceramics presented the most appropriate level of familiarity and challenge (see Table 3.2). In order to present students with a learning challenge in which they could explore a medium that is somewhat familiar and employ a novel technique in hand-building skills, the Ceramics Tar-Paper Slab Project was employed as the unit of instruction.

TABLE 3.2. Art experience survey results.

Students report experience in the following media prior to the initial experimental research:	
Drawing	98%
Painting	93%
Printmaking	31%
Ceramics (Hand-Building)	50%
Ceramics (Wheel-Throwing)	11%
Photography	51%
Digital Photography	31%
Graphic Art / Graphic Design	30%
Animation (Hand-drawn)	33%
Animation (Digital)	15%
Film-Making	11%
Digital Image Manipulation	16%
Collage	41%
Sculpture	35%
Wood (building or carving)	18%
Metals (building or sculpting)	3%
Jewelry making (any type)	0%
Other	0%

The Unit of Visual Arts Instruction

Lesson plan 1: Tar paper clay slab project. The objective of this lesson is for students to learn basic Ceramics concepts and practice basic skills of ceramic hand-building techniques in order to create a tarpaper ceramic slab vessel. Various scaffolded and medium-specific processes include but are not limited to recognizing the various stages of clay (green ware, bisque ware, and glaze ware), wedging clay, throwing slabs of clay by hand, scoring and use of slip to adhere parts of clay together, kiln firing, vitrification, glazing, creating patterns, use of spatial planning, surface treatments, and clay construction techniques.

The use of tarpaper as a support structure in this lesson is important in the flexibility of vertical and horizontal shapes allowed that are not normally able to be created in a slab-constructed clay project without the support of the tarpaper. The tarpaper provides a rigidity to the green ware (still wet and heavy) clay. The support of the tarpaper template allows for many options of shapes and sides for the finished clay vessel product.

Production process. Students create and cut a template from tarpaper, using a pattern piece for each side of the vessel, and the bottom of the vessel. It is important to note that for this project, part of the requirements for the project grade is that the vessel has "a bottom, and at least two sides". Students attach the patterns to their hand-thrown slabs of clay and cut the clay patterns out. The pattern pieces are assembled into the vessel shape with scoring and slip application to join clay pieces. After a sufficient drying to a leather-hard state, and decorative techniques are applied, the green ware vessel is fired in the kiln, and vitrified, becoming bisque ware. Students learn to apply

glaze to the bisque ware, and the glazed vessel is again fired in the kiln to complete the project.

Discussion board A. At the beginning of the unit of instruction, students were instructed to answer the discussion board on the classroom website. The discussion board prompt is as follows:

> Answer the following in complete sentences. Use examples to support your ideas if needed. You do not need to respond to anyone's post, but I would appreciate seeing a lively academic discussion. If you disagree with someone, now is a good time to appropriately practice doing so, and using evidence to back up your opinion.
>
> What is creativity? What is it like for you when you experience creativity? Attach a link to an artwork or idea (video or website) that you think is creative. Explain why you think it is creative. Keep your content academically appropriate.

Reflection. Students were introduced to a project-specific critique process in which they reflected upon the process of creating the tarpaper clay slab projects. The focus of the critique is an analysis of the finished work (the pretest) and of the process of creating the work. Construction and creative choices were discussed and reflected upon by students, and the students reviewed the techniques they employed. The overall success of the completed work is discussed with opportunity to imagine changes that the student would have made if they were able to re-do the exact same project. (See Appendix, Ceramics Critique 1). It is important to note that success of student artwork is discussed per each individual project. At the end of the teacher-led group discussion, a

"gallery walk" around the classroom to view the finished pretest projects was employed to assist students in viewing their personal works comparatively to the other works in the class, also assisting in the critique process. The teacher discussed the observation of themes and similarities within the group, and also original solutions to the task. During the group "gallery walk" critique, students practice their presentation, analysis, and communication skills.

At the end of the self-critique document is a Creativity Criteria chart. The students reflected and wrote about how they met the creativity criteria, and also rated their success in meeting the creativity criteria on a scale of 0 to 5. The teacher also rated student work according to the Creativity Criteria with the evidence of the project itself, and taking into consideration the complexity of text within the student responses, using Housen's Visual Literacy Scale as a guide. Students used the teacher rating as part of a conversation, or data-driven "error analysis". The question was again revisited from the written Ceramics Critique 1, "What could be improved if you were to recreate your project?". Students responded with their answers and were then informed that their next ceramics project would have the same exact requirements, that the project "must have a bottom and at least two sides".

Lesson plan 2: Ceramics surface treatment techniques.

Both groups were provided a weeklong lesson and demonstration on ceramics surface treatments. Surface treatments demonstrated and discussed included but were not limited to incising, carving, stamping, applique, application of coils, burnishing, application of an under glaze, glazing and reglazing techniques, sgraffito, smoothing,

textural applications with textiles, slip decoration, and use of design motifs and iconographic components.

Production process. Production process for the posttest project, the Tar Paper Clay Slab Project Including Ceramics Surface Treatments, followed much of the same procedure with much of the same considerations. Students again use tarpaper patterns to cut clay patterns out and assemble into the vessel shape. After a thorough drying, and decorative techniques are applied, the green ware vessel is fired in the kiln, and vitrified, becoming bisque ware. Students apply glaze to the bisque ware, and the glazed vessel is again fired in the kiln to complete the project.

Treatment. Identical to the pretest tar paper slab project, part of the requirements for the posttest tarpaper slab project grade are that the vessel has "a bottom, and at least two sides". Both groups used their critiques and creativity rubrics for the error analysis. The difference in treatment between groups is the motivation for the posttest assessment. The control group exposed to the Authentic Assessment was frequently directed to focus on the essential question for revision, "How can we make our projects more creative?", and the experimental group exposed to QDDA frequently directed to focus on the essential question, "how can we increase our creativity scores according to the rubric?". Throughout the treatment, discussions were held during production time in the classroom about creativity. All discussion questions were repeated in both control and experimental group, with the repetition of the objective for the project revision. The control group exposed to the Authentic Assessment objective remained, "How can we make our projects more creative?", and the experimental group exposed to QDDA objective remained, "how can we increase our creativity scores according to the rubric?". During

an in-class discussion, students were asked to create their own way to judge if a project is creative or not, leading to the Student-Generated Creativity Rubric. That rubric is included in the posttest Ceramics Critique 2 as part of the student self-reflection process. It is worthwhile to note that there are some very striking similarities from the Student-Generated Creativity Rubric to the professional recommendations of assessing creativity from the research of Teresa Amabile, Raymond Veon, and Mihaly Csikszentmihalyi as reviewed in this Chapter II Review of Literature.

Discussion board B. Toward the ending of the first unit of instruction on ceramics surface treatments and work production, students were instructed to answer the discussion board on the classroom website. The discussion board prompt is as follows:

"For your next Tar Paper slab project, what surface treatments are you considering? Describe them and/or link to images of them here."

Results to the discussion board are presented in the Appendix.

Discussion board C. Toward the middle of the second lesson of instruction and work production, students were instructed to answer the discussion board on the classroom website. The discussion board prompt is as follows:

> Here's your chance to show me what you plan on doing to improve on your first tar-paper slab project! We're investigating new techniques, we're sketching things out, and here: List how you are going to make the second one more creative than the first:.

Results to the discussion board are presented in the Appendix.

Reflection. Students repeated the project-specific critique process in which they reflected upon the process of creating the posttest tarpaper clay slab projects. (See

Appendix Ceramics Critique 2). The focus of the critique is an analysis of the finished work, and of the process of creating the work. The overall success of the completed work is discussed, just as in the pretest Ceramics Critique 1 reflection. The Student-Generated Creativity Rubric was included in the posttest Ceramics Critique 2 reflection. At the end of the self-critique document is the same Creativity Criteria chart exactly the same as in the pretest Ceramics Critique 1. The students again reflected and wrote about how they met the creativity criteria, and also rated their success in meeting the creativity criteria on a scale of 0 to 5.

As was done with the Ceramics Critique 1, the teacher also rated student work according to the Creativity Criteria for the Ceramics Critique 2 with the evidence of the project itself, and taking into consideration the complexity of text within the student responses, using Housen's Visual Literacy Scale as a guide. The data collected from teacher rating of creativity in the Creativity Criteria Rubric was collected to compare for gains in individual scores from pretest to posttest.

Consensual Creativity Scores were determined by an independent panel of appropriate observers whom are familiar with the task and have come to a consensual agreement on what creativity is pertaining directly to the project the students have completed, and specific to the project tasks.

Panelists were local professionals, educators within the district of the initial experimental research, working in the same district with the same age population as in the initial experimental research. Four panelists are Middle School Visual Arts Teachers within the district of the initial experimental research. One panelist is an Instructional Assistant in the Special Education program at the initial experimental research site, with

an undergraduate degree in Art. One panelist is a Math teacher at the initial experimental research school site, with an undergraduate minor in Art. Another panelist, a Science teacher at the initial experimental research school site has a background in Art, specific to Ceramics. This panelist became ill just prior to the juried exhibit, and was unable to participate.

Panelists were informed of the pretest project, the task of the pretest project, the treatment lessons and supporting discussion boards, the images and responses presented to the students within the treatment, and the student-generated creativity criteria for the posttest project. The posttest project had the same tasks and parameters as the pretest project. The difference between groups was that the control group aimed for an increase in creativity, and the experimental group aimed for an increase in creativity score according to the rubric. After completion of the pretest, both groups received individualized teacher feedback with a rating from the teacher in response to the student creativity score, and written and verbal feedback for each individual student, specific to their project.

Panelists were also provided with blank copies of both pretests and posttests. Panelists asked the teacher/experimenter if student grades for the projects (pretests and posttests) were influenced by the creativity rubric scores. It was discussed that the creativity scores were introduced as an important factor to guide the student reflection on their work as they critique the project, but students were aware that the creativity scores were not included in student grades. In order to avoid results that could have been influenced further by extrinsic motivations such as grades, student grades were entirely independent of the creativity rubric scores.

Panelists used all this information to create a consensual agreement on the panel assessment for creativity of all student posttest works. Panelists disregarded the use of a linear scale for the creativity rating, noting that the creativity rubrics students had generated as a student group seemed more inclusive and appropriate to the task of the project. The panelists decided to retain much of the creativity assessment criteria used on student pretests and posttests.

The first two criteria used on student pretests and posttests rubrics ("Work synthesizes ideas in original and surprising ways", and "Novel or valuable response to the task") were kept. Panelists adopted the latter two criteria from the student-generated creativity criteria ("Work is improved from Pretest to Posttest", and "Work is original from others in the class"). Inclusion of the third criteria (improvement from pretest to posttest) required the inclusion of pretest images from each pretest project to be placed beneath each posttest project. It is important to note that panelist rating of creativity applied to posttest work, but panelists used the pretest images for comparison for the third criteria (improvement from pretest to posttest). When a student had completed a posttest, but not a pretest, the image was unavailable. Panelists were instructed to skip rating in that particular third criteria only for projects without a pretest. While these posttest only projects were rated overall, the data was not included in the results for this initial experimental research – as it was unclear if the posttest was actually the students' first or second attempt at the project.

CHAPTER 4

RESULTS

The results can be divided into two main sections:

1. Instrument A: Expert Panel Posttest Only Results.

2. Instrument B: Creativity Gains Results.

Each of these is discussed below.

As previously discussed, over one hundred definitions of creativity currently exist, for the purposes of this experimental research in visual arts education, creativity is the experience of creating something new and valuable that transcends traditional ideas, rules, patterns, or relationships. The creation can be meaningful new ideas, forms, methods, interpretations, processes, or products. Creativity is defined within the context of the task, and by a consensus of appropriate observers. The products are considered creative when the task itself is heuristic, not algorithmic.

Instrument A: Expert Panel Posttest Only Results

An independent expert panel of appropriate observers whom are familiar with the task came to a consensual agreement on what creativity is pertaining directly to the project the students have completed, and specific to the project tasks. This consensual creativity agreement was defined using four criteria, as defined in the four hypotheses:

Hypothesis 1: It is hypothesized that an analysis of variance (ANOVA) will determine a statistically significant difference in creativity between the control group

utilizing Authentic Assessment and experimental group utilizing Quantitative Data-Driven Assessment (QDDA) posttest only artworks in the consensually panel-defined "Work Synthesizes Ideas in Original and Surprising Ways" with experimental group utilizing QDDA demonstrating significantly lower creativity scores in this category.

Hypothesis 2: It is hypothesized that an analysis of variance (ANOVA) will determine a statistically significant difference in creativity between the control group utilizing Authentic Assessment and experimental group utilizing Quantitative Data-Driven Assessment (QDDA) in the consensually panel defined "Novel or Valuable Response to the Task" with experimental group utilizing QDDA demonstrating significantly lower creativity scores in this category.

Hypothesis 3: It is hypothesized that an analysis of variance (ANOVA) will determine there will be a statistically significant difference in creativity between the control group utilizing Authentic Assessment and experimental group utilizing Quantitative Data-Driven Assessment (QDDA) in the consensually panel defined "Work Is Improved from Pretest to Posttest" with experimental group utilizing QDDA demonstrating significantly lower creativity scores in this category.

Hypothesis 4: It is hypothesized that an analysis of variance (ANOVA) will determine there will be a statistically significant difference in creativity between the control group utilizing Authentic Assessment and experimental group utilizing Quantitative Data-Driven Assessment (QDDA) in the consensually panel defined "Work Is Original from Others in the Class" with experimental group utilizing QDDA demonstrating significantly lower creativity scores in this category.

The four research hypotheses previously stated for the Expert Panel Posttest Only Experiment were converted to a null hypothesis in order to discuss the importance of the findings.

The statistical inference test used to retain of reject the four between group hypotheses was the sign test. The sign test is a nonparametric technique, and disregards the magnitude of the difference between scores, taking into consideration only their direction (sign), making it a rather insensitive test (Pagano, 1990). Despite its limitations, the sign test seemed to be the most suitable technique to test the four between group hypotheses. The main reason relies upon the fact that the sample scores gathered in this study are not randomized samples from normally distributed populations (Pagano, 1990). Likewise, the ordinal scale resulting from the data collected in this experiment also determined the nonparametric statistical inference technique to test between group's null hypotheses. In this study, the statistical inference test used was the Analysis of Variance (ANOVA) test comparison between two variables. In this study, the alpha level was set a 0.05. Therefore, the level of significance in accepting or rejecting the null hypothesis was 0.05.

Instrument A: Expert Panel Posttest Only Experiment Null Hypotheses

Overall Results demonstrate no significant difference between groups in creativity scores. See Figure 4.1

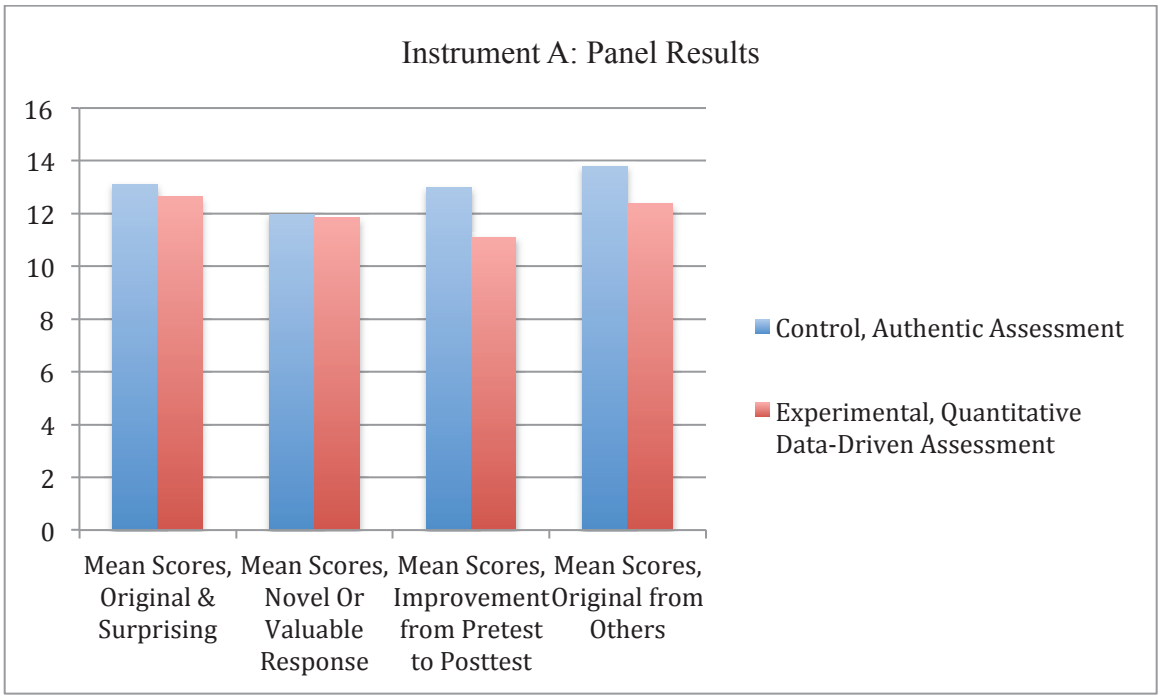


FIGURE 4.1. Overall expert panel posttest only results.

The results will be addressed in the order of null hypotheses as consensually defined by the independent panel of appropriate observers whom are familiar with the task.

Null hypothesis 1: It is hypothesized that an analysis of variance (ANOVA) will determine no statistically significant difference in creativity between the control group utilizing Authentic Assessment and experimental group utilizing Quantitative Data-Driven Assessment (QDDA) posttest only artworks in the consensually panel-defined "Work Synthesizes Ideas in Original and Surprising Ways" with experimental group utilizing QDDA demonstrating similar creativity scores in this category.

Null Hypothesis 1 Results

Mean scores with a 95% confidence interval of "Work synthesizes ideas in original and surprising ways" for the control group was higher at 13.11 than the mean scores for the experimental group at 12.63. However, the ANOVA difference is not statistically significant. The results for null Hypothesis 1 has not been proven.

When examining the range of scores between groups, however, it is important to note that the control group demonstrated a greater range of scores in the category of "Work synthesizes ideas in original and surprising ways" as defined by the panel, and also demonstrated higher top scores.

Ideas in Original and Surprising Ways:

Summary Statistics by Group

```
group: C
  vars  n  mean   sd median trimmed   mad min max range skew kurtosis   se
1    1 19 13.11 9.83     13   12.94 14.83   0  29    29 0.23    -1.57 2.26
------------------------------------------------------------------------
group: E
  vars  n  mean   sd median trimmed  mad min max range skew kurtosis   se
1    1 19 12.63 8.88     11   12.35 7.41   0  30    30  0.6    -0.82 2.04
```

ANOVA Results: The difference in mean score IS NOT significant

```
            Df Sum Sq Mean Sq F value Pr(>F)
group        1    2.1    2.13   0.024  0.877
Residuals   36 3160.2   87.78
```

FIGURE 4.2. Null hypothesis 1 ANOVA results.

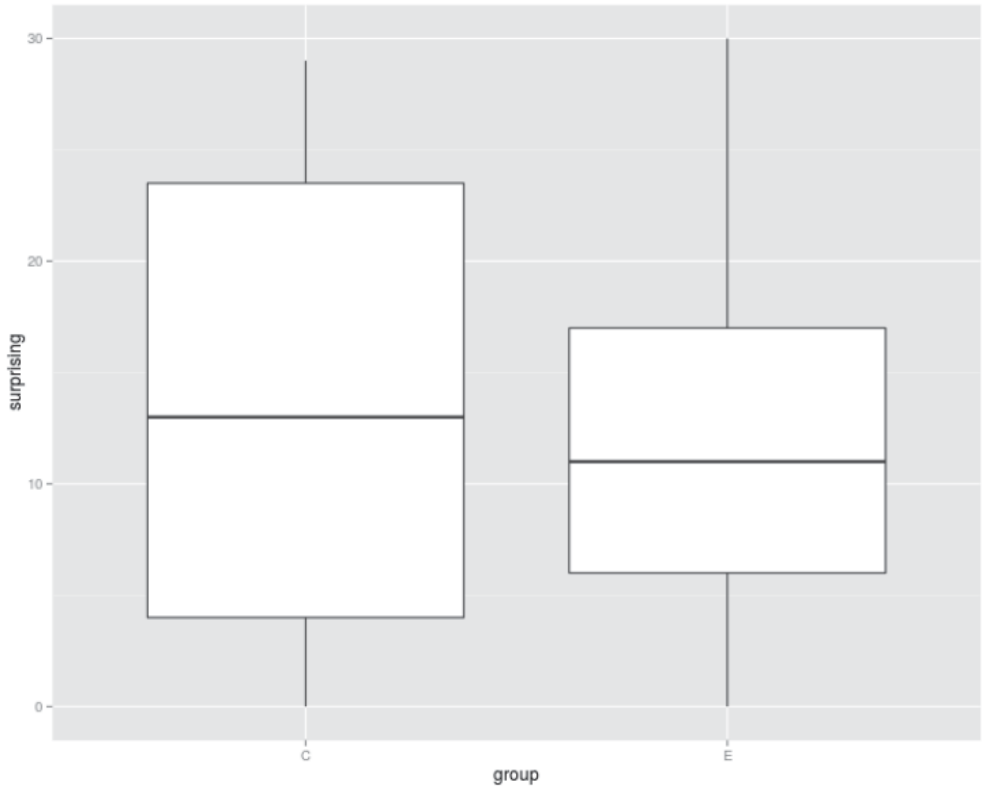


FIGURE 4.3. Null hypothesis 1 ANOVA results boxplot

Null hypothesis 2: It is hypothesized that an analysis of variance (ANOVA) will determine no statistically significant difference in creativity between the control group utilizing Authentic Assessment and experimental group utilizing Quantitative Data-Driven Assessment (QDDA) in the consensually panel defined "Novel or Valuable Response to the Task" with experimental group utilizing QDDA demonstrating similar creativity scores in this category.

Null Hypothesis 2 Results

Mean scores with a 95% confidence interval of "Novel or Valuable Response to the Task" for the control group was higher at 11.95 than the mean scores for the

experimental group at 11.84. However, the ANOVA difference is not statistically significant. The results for null Hypothesis 2 have not been proven.

When examining the range of scores between groups, however, it is important to note that the control group demonstrated a greater range of scores in the category of "Novel or Valuable Response to the Task" as defined by the panel, and also demonstrated higher top scores, just as with the H1 category of ("Work synthesizes ideas in original and surprising ways".

Novel or Valuable Response to the Task:

Summary Statistics by Group

```
group: C
  vars  n  mean   sd median trimmed   mad min max range skew kurtosis   se
1    1 19 11.95 8.87     11   11.65 10.38   1  28    27 0.36    -1.42 2.03
------------------------------------------------------------------------
group: E
  vars  n  mean   sd median trimmed  mad min max range skew kurtosis   se
1    1 19 11.84 8.66     10   11.47 7.41   1  29    28 0.64    -0.81 1.99
```

ANOVA Results: The difference in mean score IS NOT significant

```
            Df Sum Sq Mean Sq F value Pr(>F)
group        1    0.1    0.11   0.001  0.971
Residuals   36 2765.5   76.82
```

FIGURE 4.4. Null hypothesis 2 ANOVA results.

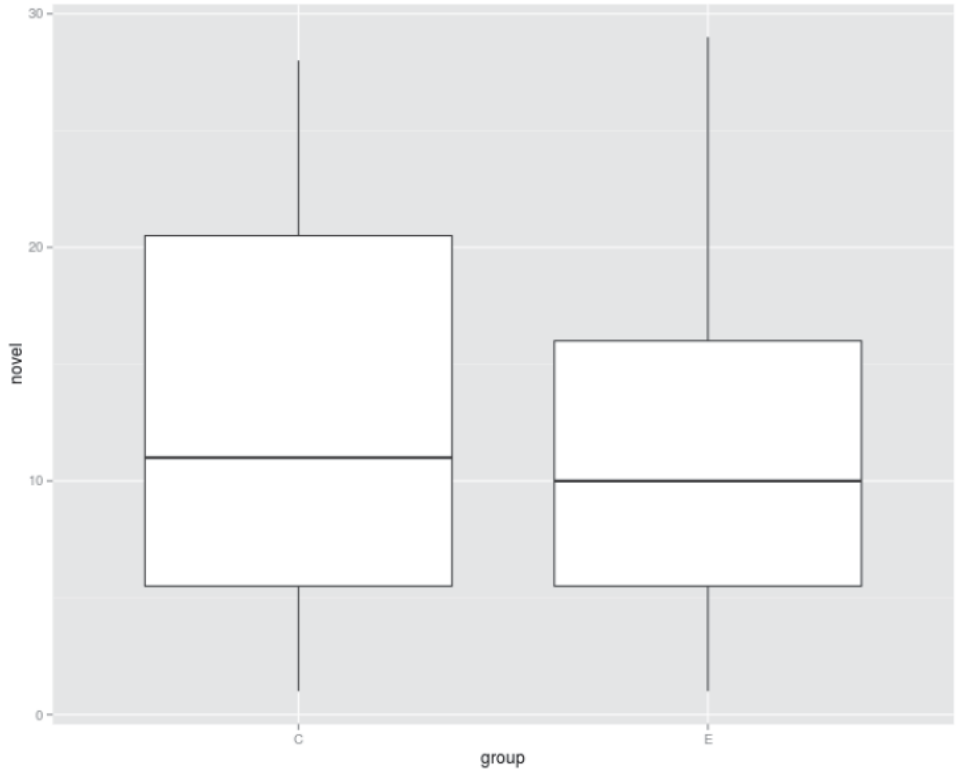


FIGURE 4.5. Null hypothesis 2 ANOVA results boxplot.

Null hypothesis 3: It is hypothesized that an analysis of variance (ANOVA) will determine there will be no statistically significant difference in creativity between the control group utilizing Authentic Assessment and experimental group utilizing Quantitative Data-Driven Assessment (QDDA) in the consensually panel defined "Work Is Improved from Pretest to Posttest" with experimental group utilizing QDDA demonstrating similar creativity scores in this category.

Null Hypothesis 3 Results

Mean scores with a 95% confidence interval of "Work is improved from pretest to posttest" for the control group was higher at 13.0 than the mean scores for the

experimental group at 11.11. However, the ANOVA difference is not statistically significant. The results for null Hypothesis 3 have not been proven.

When examining the range of scores between groups, however, it is important to note that the experimental group demonstrated a greater range of scores in the category of "Work is improved from pretest to posttest" as defined by the panel, and also demonstrated lower low scores.

From Pre-test to Post-test:

Summary Statistics by Group

```
group: C
  vars  n mean   sd median trimmed mad min max range skew kurtosis   se
1    1 19   13 7.96     13      13 8.9   0  26    26 0.13    -0.98 1.83
------------------------------------------------------------------------
group: E
  vars  n  mean   sd median trimmed mad min max range skew kurtosis   se
1    1 19 11.11 7.64      9   10.82 8.9   1  26    25  0.3    -1.41 1.75
```

ANOVA Results: The difference in mean score IS NOT significant

```
            Df Sum Sq Mean Sq F value Pr(>F)
group        1   34.1   34.11    0.56  0.459
Residuals   36 2191.8   60.88
```

FIGURE 4.6. Null hypothesis 3 ANOVA results.

Null hypothesis 4: It is hypothesized that an analysis of variance (ANOVA) will determine there will be no statistically significant difference in creativity between the control group utilizing Authentic Assessment and experimental group utilizing Quantitative Data-Driven Assessment (QDDA) in the consensually panel defined "Work

Is Original from Others in the Class" with experimental group utilizing QDDA demonstrating similar creativity scores in this category.

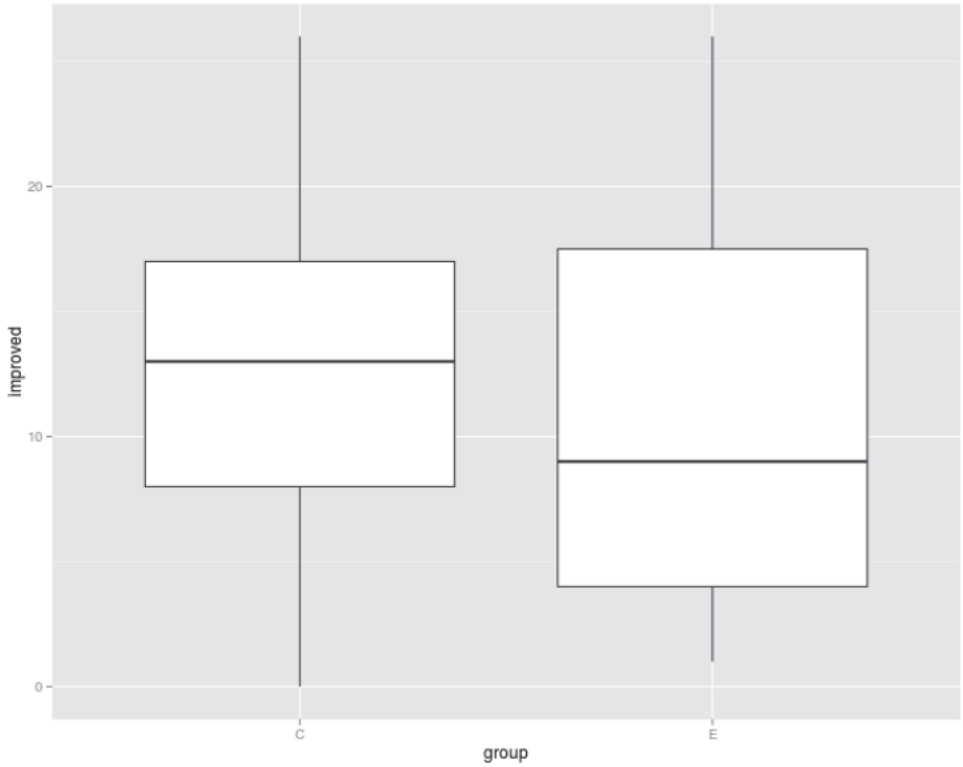


FIGURE 4.7. Null hypothesis 3 ANOVA results boxplot

Null Hypothesis 4 Results

Mean scores with a 95% confidence interval of "Work is Original From Others in the Class" for the control group was higher at 13.79 than the mean scores for the experimental group at 12.37. However, the ANOVA difference is not statistically significant. The results for null Hypothesis 4 have not been proven.

When examining the range of scores between groups, however, it is important to note that the control group demonstrated a greater range of scores in the category of "Work is Original From Others in the Class" as defined by the panel, and also demonstrated higher Originality scores.

Work is Original from Others in the Class. :

Summary Statistics by Group

```
group: C
  vars  n  mean    sd median trimmed   mad min max range skew kurtosis   se
1    1 19 13.79 10.13     14   13.71 16.31   0  29    29 0.12    -1.58 2.32
------------------------------------------------------------------------
group: E
  vars  n  mean   sd median trimmed mad min max range skew kurtosis   se
1    1 19 12.37 8.41     10   12.18 8.9   0  28    28 0.48    -0.99 1.93
```

ANOVA Results: The difference in mean score IS NOT significant

```
            Df Sum Sq Mean Sq F value Pr(>F)
group        1   19.2   19.18   0.221  0.641
Residuals   36 3119.6   86.65
```

FIGURE 4.8. Null hypothesis 4 ANOVA results.

Some student posttest work that had been judged by the panelists had been very recently completed and was still in a green ware state, the un-fired clay that is very fragile, and still malleable if it is at all wet. Green ware when dry is extremely fragile, and easily broken. Recent kiln explosions during the last week of the treatment lesson due to inclimate weather and other unforeseen circumstances had negatively affected the quantity of projects in both the control group and experimental group results sample. In two separate kiln firings, a student had left tarpaper on their green ware project, and

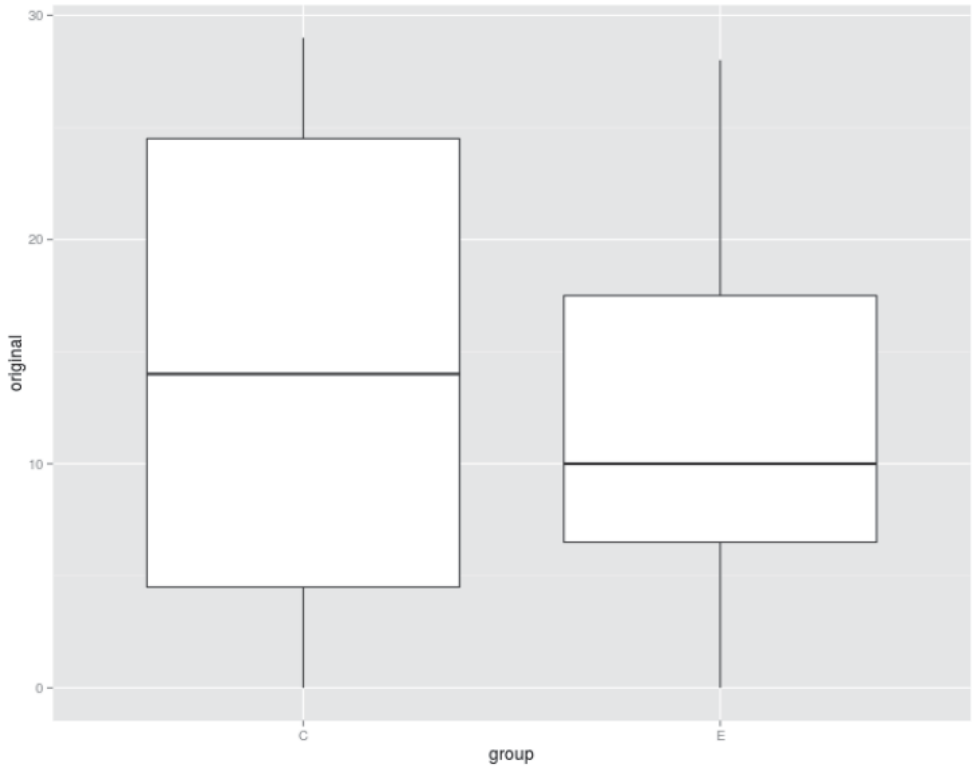


FIGURE 4.9. Null hypothesis 4 ANOVA results boxplot.

covered the tarpaper with clay to hide the remaining tarpaper. It is suspected that in these two kiln firings, the green ware with tarpaper exploded, in such a way that the exploded shrapnel broke many nearby projects in the kiln.

In spite of the setbacks, students felt compelled to participate in the panel gallery showing, and had rushed to create last-minute green ware for inclusion into the gallery for the panelists. The green ware was rated, but the data collected from the green ware was omitted from the results for this initial experimental research. The green ware projects were completed under a much smaller timeline, (some within three hours, instead of two to three weeks), and under increased pressure with the rapidly changing ambient

humidity levels, kiln firing schedules, and a more rapidly approaching deadline to assemble the gallery exhibit for the arriving panelists.

With the omission of the green ware projects from the overall initial experimental research panel results data, and the projects that had no pretest data available, nineteen projects remained in the overall initial experimental research panel data in the control group, and nineteen projects remained in the overall data in the experimental group.

The panel had a few questions regarding the second criteria, a "novel or valuable response to the task". The criteria was defined as novel being "new" to the task, or valuable being "something that can be used" after the task, just as it was explained to the students. However, it is important to note that many student posttest projects were cylindrical in form. The task of the project, pretest and posttest, was to "create a tar paper slab project with a bottom and at least two sides". Many of the panelists contended that the task of the project was not met if the posttest project was cylindrical in form such as a mug or vase, as cylinders have only a bottom and one side: the cylinder wall. This is significant because both the control group and experimental groups exhibited posttest projects that were cylindrical. One project had no bottom, and no side, as the final product was a hanging wind-chime. The wind-chime and cylindrical-shaped posttest projects were not removed from the data sample.

TABLE 4.1: Expert panel posttest summary results

SUMS OF PANEL SCORES	Work synthesizes ideas in original and surprising ways	Novel or valuable response to the task	Work is improved from pretest to posttest	Work is original from others in the class.
CONTROL GROUP	249	227	247	262
EXPERIMENTAL GROUP	240	225	211	235
Difference	9	2	36	27

MEAN PANEL SCORES	Work synthesizes ideas in original and surprising ways	Novel or valuable response to the task	Work is improved from pretest to posttest	Work is original from others in the class.
CONTROL GROUP	13.11	11.95	13.00	13.79
EXPERIMENTAL GROUP	12.63	11.84	11.11	12.37
Difference	0.38	0.11	1.89	1.42

AVERAGE PANEL SCORE PERCENTAGE	Work synthesizes ideas in original and surprising ways	Novel or valuable response to the task	Work is improved from pretest to posttest	Work is original from others in the class.
CONTROL GROUP	44%	40%	43%	46%
EXPERIMENTAL GROUP	42%	39%	37%	41%
Difference	2%	1%	6%	5%

Instrument B: Creativity Pretest/Posttest Gains Experiment Results

As previously discussed, over one hundred definitions of creativity currently exist, for the purposes of this experimental research in visual arts education, creativity is the experience of creating something new and valuable that transcends traditional ideas, rules, patterns, or relationships. The creation can be meaningful new ideas, forms, methods, interpretations, processes, or products. Creativity is defined within the context of the task, and by a consensus of appropriate observers. The products are considered creative when the task itself is heuristic, not algorithmic.

The second instrument in this initial experimental research tested four hypotheses in order to determine the method of assessment's increase or reduction of creativity between the control group using authentic assessment and the experimental group using quantitative data-driven instruction. Teacher-Evaluation Scores were compared for gains in scores from pretest to posttest between groups for the following four hypotheses;

Hypothesis 5: It is hypothesized that an analysis of variance (ANOVA) will determine there will be significant decrease in creativity in the experimental group utilizing Quantitative Data-Driven Assessment (QDDA) from pretest to posttest demonstrated in Teacher Evaluations in the creativity category "Synthesis of Ideas In Original and Surprising Ways".

Hypothesis 6: It is hypothesized that an analysis of variance (ANOVA) will determine there will be significant decrease in creativity in the experimental group utilizing Quantitative Data-Driven Assessment (QDDA) from pretest to posttest demonstrated in Teacher Evaluations in the creativity category "Novel or Valuable Response to the Task".

Hypothesis 7: It is hypothesized that an analysis of variance (ANOVA) will determine there will be significant decrease in creativity in the experimental group utilizing Quantitative Data-Driven Assessment (QDDA) from pretest to posttest demonstrated in Teacher Evaluations in the creativity category "Work Makes Student Ask New Questions to Build Upon An Idea".

Hypothesis 8: It is hypothesized that an analysis of variance (ANOVA) will determine there will be significant decrease in creativity in the experimental group utilizing Quantitative Data-Driven Assessment (QDDA) from pretest to posttest demonstrated in Teacher Evaluations in the creativity category "Enables Student To Discover, Learn Something Not Directly Instructed".

The four research hypotheses previously stated for the Creativity Pretest/Posttest Gains Experiment were converted to a null hypothesis in order to discuss the importance of the findings.

The statistical inference test used to retain of reject the four between group hypotheses was the sign test. The sign test is a nonparametric technique, and disregards the magnitude of the difference between scores, taking into consideration only their direction (sign), making it a rather insensitive test (Pagano, 1990). Despite its limitations, the sign test seemed to be the most suitable technique to test the four between group hypotheses. The main reason relies upon the fact that the sample scores gathered in this study are not randomized samples from normally distributed populations (Pagano, 1990). Likewise, the ordinal scale resulting from the data collected in this experiment also determined the nonparametric statistical inference technique to test between group's null hypotheses. In this study, the statistical inference test used was the Analysis of

Variance (ANOVA) test of comparison between two variables. In this study, the alpha level was set a 0.05. Therefore, the level of significance in accepting or rejecting the null hypothesis was 0.05.

Instrument B: Creativity Pretest/Posttest Gains Experiment Null Hypotheses.

The results will be addressed in the order of null hypothesis.

Null hypothesis 5: It is hypothesized that an analysis of variance (ANOVA) will determine there will be no significant decrease in creativity in the experimental group utilizing Quantitative Data-Driven Assessment (QDDA) from pretest to posttest demonstrated in Teacher Evaluations in the creativity category "Synthesis of Ideas In Original and Surprising Ways".

Null Hypothesis 5 Results

Mean gain scores "Synthesis of Ideas In Original and Surprising Ways" for the control group demonstrated an increase in Teacher Evaluation Scores from 2.97 to 3.40. Mean gain scores "Synthesis of Ideas In Original and Surprising Ways" for the experimental group demonstrated a decrease in Teacher Evaluation Scores from 3.28 to 3.00. The ANOVA difference is not statistically significant between groups for Teacher Evaluation Results. The results for Hypothesis 5 have not been proven.

When examining the range of gain scores between groups it is important to note that the control group demonstrated a gain in scores between pretest to posttest and the experimental group demonstrated a decrease in creativity from pretest to posttest in the category of "Synthesis of Ideas In Original and Surprising Ways".

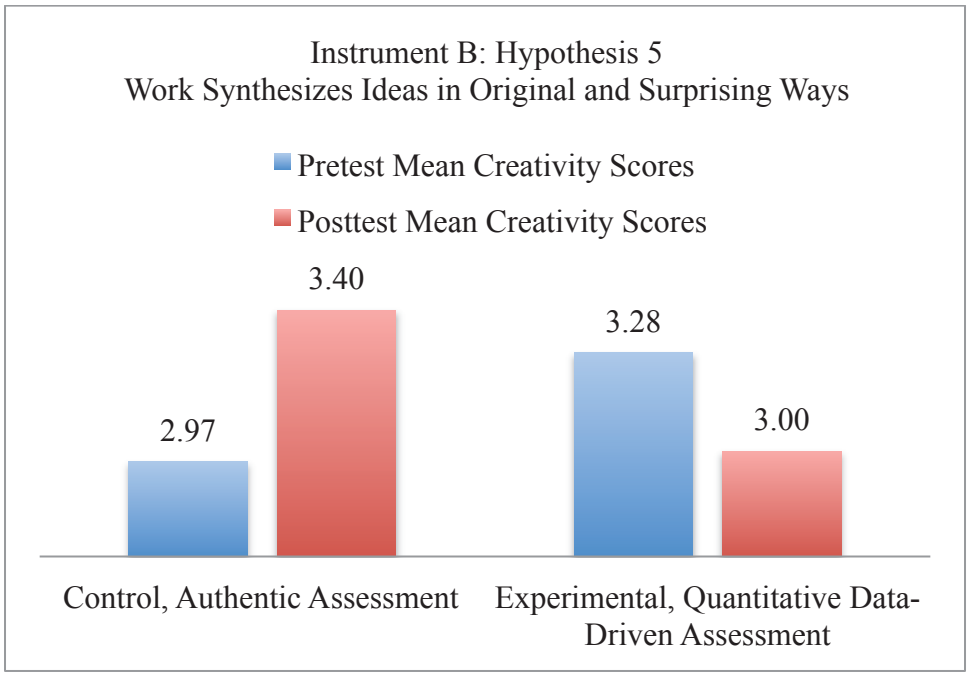


FIGURE 4.10. Instrument B null hypothesis 5 ANOVA results.

ANOVA TABLE: Synthesis of ideas in original & surprising ways (No significant difference)					
	Df	Sum Sq	Mean Sq	F value	Pr(>F)
group	1	0.71	0.7063	0.268	0.608
Residuals	32	84.26	2.6333		
39 observations deleted due to missingness					

FIGURE 4.11. Instrument B null hypothesis 5 ANOVA table results.

Null hypothesis 6: It is hypothesized that an analysis of variance (ANOVA) will determine there will be no significant decrease in creativity in the experimental group utilizing Quantitative Data-Driven Assessment (QDDA) from pretest to posttest

demonstrated in Teacher Evaluations in the creativity category "Novel or Valuable Response to the Task".

Null Hypothesis 6 Results

Mean gain scores "Novel or Valuable Response to the Task" for the control group demonstrated an increase in Teacher Evaluation Scores from 2.59 to 2.69. Mean gain scores "Novel or Valuable Response to the Task" for the experimental group demonstrated an increase in Teacher Evaluation Scores from 2.88 to 3.23. The ANOVA difference is not statistically significant between groups for Teacher Evaluation Results. The results for Hypothesis 6 have not been proven, as there is no statistically significant difference in gains between control and experimental groups in the creativity scores for the category of "Novel or Valuable Response to the Task".

It is important to summarize that in the Teacher Evaluation both the control group and the experimental group demonstrated a gain in scores between pretest to posttest in the category of "Novel or Valuable Response to the Task", with the experimental group demonstrating greater gains.

Null hypothesis 7: It is hypothesized that an analysis of variance (ANOVA) will determine there will be significant decrease in creativity in the experimental group utilizing Quantitative Data-Driven Assessment (QDDA) from pretest to posttest demonstrated in Teacher Evaluations in the creativity category "Work Makes Student Ask New Questions to Build Upon An Idea".

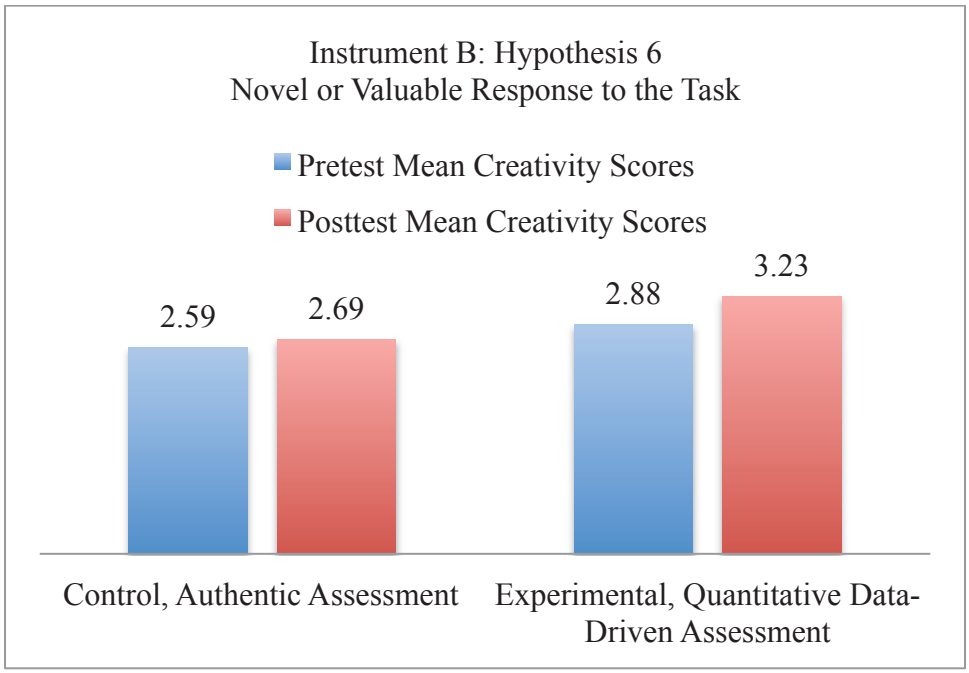


FIGURE 4.12. Instrument B null hypothesis 6 ANOVA results.

ANOVA TABLE: Novel or valuable response to the task (No significant difference)				
	Df	Sum Sq	Mean Sq	F value Pr(>F)
group	1	7.88	7.880	2.725 0.109
Residuals	31	89.64	2.891	
40 observations deleted due to missingness				

FIGURE 4.13. Instrument B null hypothesis 6 ANOVA table results.

Null Hypothesis 7 Results

Mean gain scores "Work Makes Student Ask New Questions, Build Upon An Idea" for the control group demonstrated a decrease in Teacher Evaluation Scores from 2.18 to 2.06. Mean gain scores "Work Makes Student Ask New Questions, Build Upon

An Idea" for the experimental group demonstrated a decrease in Teacher Evaluation Scores from 3.24 to 1.91. The ANOVA difference is statistically significant between groups for Teacher Evaluation Results. The results for Hypothesis 7 have been proven, as there is a statistically significant difference in gains/losses between control and experimental groups on the creativity scores for the category of "Work Makes Student Ask New Questions, Build Upon An Idea". ANOVA Results demonstrate statistically significant difference in gains/losses for between groups in Teacher Evaluation scores. The control group demonstrated less loss of score for Teacher Evaluation in the category of "Work Makes Student Ask New Questions, Build Upon An Idea".

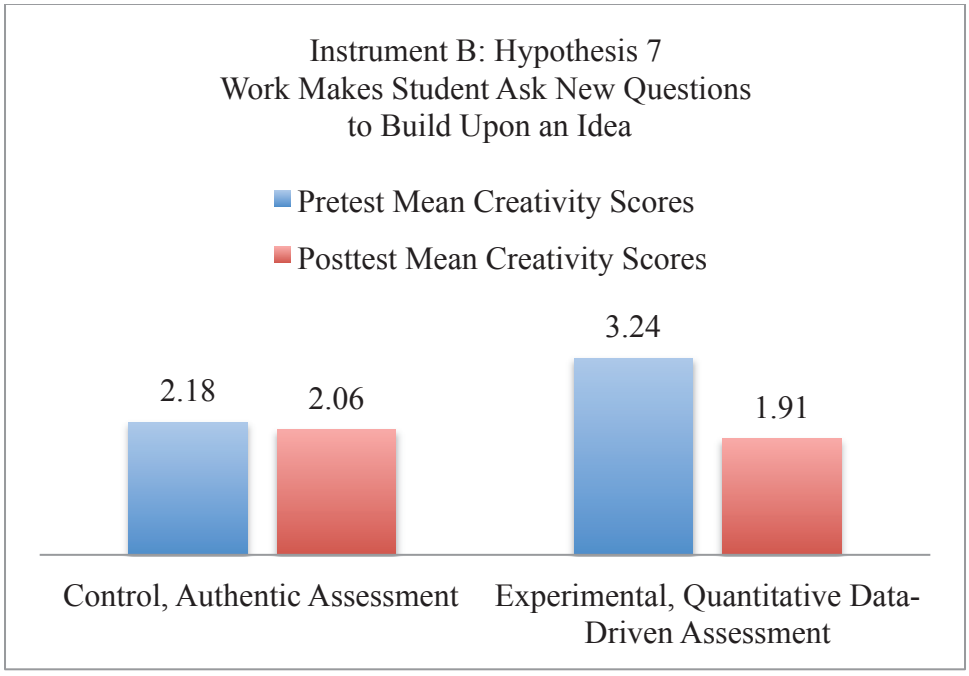


FIGURE 4.14. Instrument B null hypothesis 7 ANOVA results.

ANOVA TABLE: Work makes student ask new questions, build upon an idea (Demonstrates significant difference)					
	Df	Sum Sq	Mean Sq	F value	Pr(>F)
group	1	14.85	14.850	5.227	0.029 *
Residuals	32	90.91	2.841		
39 observations deleted due to missingness					

FIGURE 4.15. Instrument B null hypothesis 7 ANOVA table results

Null hypothesis 8: It is hypothesized that an analysis of variance (ANOVA) will determine there will be significant decrease in creativity in the experimental group utilizing Quantitative Data-Driven Assessment (QDDA) from pretest to posttest demonstrated in Teacher Evaluations in the creativity category "Enables Student To Discover, Learn Something Not Directly Instructed".

Null hypothesis 8 results: Mean gain scores "Enables Student To Discover, Learn Something Not Directly Instructed" for the control group demonstrated an increase in Teacher Evaluation Scores from 2.11 to 2.56. Mean gain scores "Enables Student To Discover, Learn Something Not Directly Instructed" for the experimental group demonstrated a decrease in Teacher Evaluation Scores from 3.00 to 2.27. The ANOVA difference demonstrates statistical significance for difference in gains between groups for Teacher Evaluation Results. The results for null Hypothesis 7 have been proven, as there is a statistically significant difference in gains/losses between control and experimental groups on the Teacher Evaluation creativity scores for the category of "Enables Student To Discover, Learn Something Not Directly Instructed".

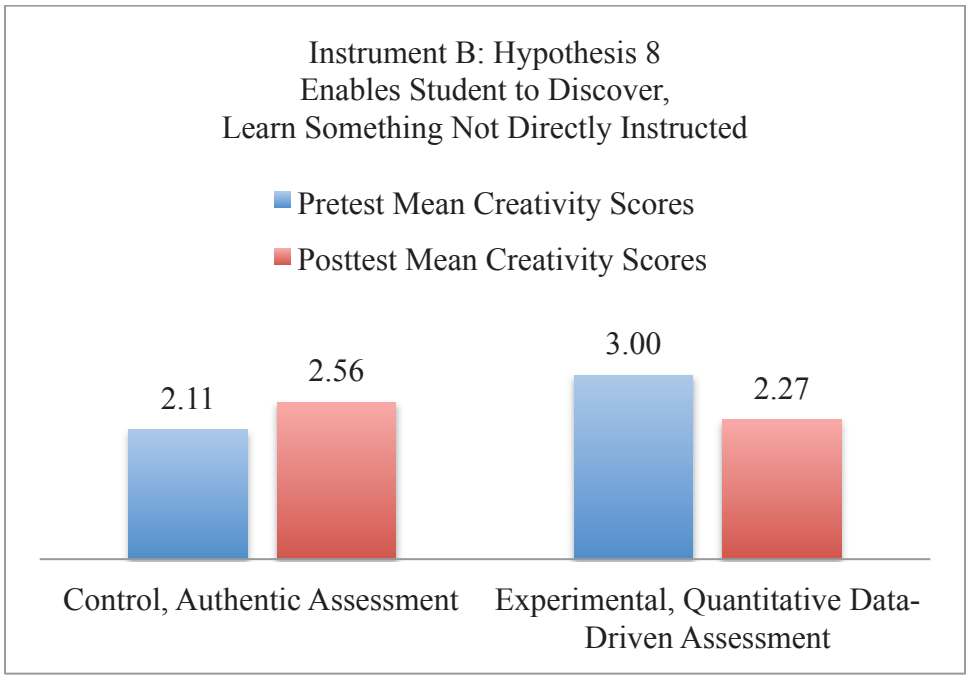


FIGURE 4.16. Instrument B Null Hypothesis 8 ANOVA Results

ANOVA TABLE: Enables student to discover, learn something not directly instructed (Demonstrates significant difference)					
	Df	Sum Sq	Mean Sq	F value	Pr(>F)
group	1	18.74	18.741	8.895	0.00553 **
Residuals	31	65.32	2.107		
40 observations deleted due to missingness					

FIGURE 4.17 Instrument B Null Hypothesis 8 ANOVA TABLE Results

CHAPTER 5

CONCLUSIONS

General Conclusions

Although over one hundred definitions of creativity currently exist, for the purposes of this experimental research in Visual Arts Education, creativity is the experience of creating something new and valuable that transcends traditional ideas, rules, patterns, or relationships. The creation can be meaningful new ideas, forms, methods, interpretations, processes, or products. Creativity is defined within the context of the task, and by a consensus of appropriate observers. The products are considered creative when the task itself is heuristic, not algorithmic.

One of the most important outcomes of an education with art includes encouraging "creativity and innovative thinking in young minds" (PCAH, 2011 p. 8). It is important to again acknowledge that Art Education does not hold the monopoly on teaching creativity within the schools. However, it is one of the core academic subjects where the student success and the success of the art program is continually approved or condemned by the creativity of the curriculum, and the creativity of the student work produced, or the end product. Art Education curricula regularly incorporate creativity as a vehicle with which to acquire and practice the higher-order thinking skills and communication skills, which educational reformers strive for students to acquire (NAEP, 2008). It is the opinion of the author that any limit to creativity in this scope is

counterproductive to classroom, school, community, and educational expectations. The impact is further broadened when students no longer are our students, but have graduated from school and go on to lead productive lives as employees, employers, policy-makers, and furthermore consumers and creators of the culture where convergent and quantitative answers will not always be the appropriate ones to the many complicated issues faced throughout a lifetime.

The employment of Quantitative Data-Driven Instruction and Assessment is not an objectionable pedagogical or assessment method when it is done appropriately. Quantitative Data-Driven Instruction and Assessment is best employed in academic content areas that seek convergent thinking and answers, and primarily use quantitative instructional and assessment methods. The quantitative use of data has been employed quite successfully in behavioral monitoring and disciplinary issues at the school site in which this experiment took place. Clearly seeing trends in absences and tardies, or identifying repeated behavioral issues has helped teachers, administrators, parents, and students to separate perception from the reported data. It is when Quantitative Data-Driven Instruction is employed only as a means to increase student achievement, only narrowly defined as test scores, that the student as a learner takes a subordinate position to the test score. Such implementation is myopic.

Based on the results of this experimental research, a difference in motivation toward the assessments negatively affects the demonstrated creativity. The control group's intrinsic motivation of making the posttest work "more creative" did influence the students, demonstrating higher creativity scores than the extrinsic motivation of the experimental group in "increasing creativity scores according to the rubric."

Due to the nature of the field of Art Educations' symbiotic relationship with creativity, with the recognition that creativity is a major part of what students aspire to practice and demonstrate in a Visual Arts course, any limit to creativity in this scope is counterproductive to classroom, school, community, and educational expectations. It is the opinion of the author that continued testing of any assessment methodologies should occur prior to mandating their implementation in the classroom. The desire for uniformity across all curricula in a school or district should never override best practices in any academic content area, including the Visual Arts. It is the opinion of the author that further testing of this research is highly appropriate.

The following conclusions were drawn from the analysis of data gathered in this study.

(1) Instrument A: Overall, mean creativity scores as determined by an Expert Panel of Art Educators were greater in the control group utilizing Authentic Assessment than the experimental group utilizing Quantitative Data-Driven Assessment. Differences in mean creativity scores were not statistically significant in the creativity categories, defined as "Work Synthesizes Ideas in Original and Surprising Ways", "Novel or Valuable Response to the Task", "Work is Improved from Pretest to Posttest", and "Work Is Original From Others In Class". Though the differences between groups are not statistically significant, a difference exists. The control group using Authentic Assessment showed greater creativity as juried by an independent expert panel, than the experimental group using Quantitative Data-Driven Assessment. Based on the results of Instrument A in this experimental research, it is the opinion of the author that the use of

Quantitative Data-Driven Assessment requires more testing for appropriateness prior to mandating the implementation of such assessment methods.

(2) Instrument B: Overall, creativity gain scores as determined by Teacher Evaluation from the creativity rubric were again greater in the control group utilizing Authentic Assessment than in the experimental group utilizing Quantitative Data-Driven Assessment. Differences in creativity gain scores demonstrated statistical significance in two of the four creativity categories. defined as "Work Makes Student Ask New Questions to Build Upon An Idea", and "Enables Student to Discover, Learn Something Not Directly Instructed" , but not statistically significant in the creativity categories, "Work Synthesizes Ideas in Original and Surprising Ways", and "Novel or Valuable Response to the Task". The Experimental group using Quantitative Data-Driven Instruction did perform better than the control group using Authentic Assessment in the category of "Novel or Valuable Response to the Task" although no explanation or theory is available at this time. Though the differences between groups are not statistically significant in two of four categories for Instrument B, a difference in creativity demonstrated again exists. The control group using Authentic Assessment showed greater creativity than the experimental group using Quantitative Data-Driven Assessment. Based on the results of Instrument B in this experimental research, it is the opinion of the author that the use of Quantitative Data-Driven Assessment requires more testing for appropriateness prior to mandating the implementation of such assessment methods.

(3) The employment of quantitative Data-Driven Assessment in the Visual Arts demonstrates a decrease in creativity, however statistically slight in most creativity categories. The range of creativity scores also generally decreases when Quantitative

Data-Driven Assessment is employed. The dependent variable, the posttest assessment motivation appears to be the fundamental affect upon the creativity results in both instruments. Based on the results of this experimental research, a difference in motivation toward the assessments negatively affects the demonstrated creativity. The control group's intrinsic motivation of making the posttest work "more creative" did influence the students, demonstrating higher creativity scores than the extrinsically motivation of the experimental group in "increasing creativity scores according to the rubric."

Since the aims and pedagogies of the Visual Arts overall are to encourage divergent thinking, to increase creativity and innovation (Zimmerman, 2010b), the results of these experiments demonstrate that the assessment motivations employed in the use of quantitative and convergent Data-Driven Instruction and Assessment are counterproductive for desired outcomes for student learning and achievement in the visual arts. Further testing of the implementation of Quantitative Data-Driven Assessment is highly appropriate prior to mandating the implementation of such assessments.

Limitations of the Study

The unpredicted non-significance of difference of the posttest assessment motivation (dependent variable) upon the mean creativity scores between control group utilizing Authentic Assessment and experimental group utilizing Quantitative Data-Driven Assessment (independent variables) may be clarified by an examination of the methodological limitations revealed during the course of this initial experimental study. These limitations are as follows:

Limitation 1: Due to the existing conditions within the middle school available for this initial experimental research, samples were non-randomized. Random assignment is a useful tool to control the undesirable presence of confounding variables. Through effective matching techniques, randomization provides a significant equivalency between pretest experimental and posttest control groups (Dalen, Meyer, 1979.) When randomization cannot be employed, another procedure used to control variation between experimental and control groups is the Analysis of Variance (ANOVA). ANOVA was chosen to compare mean creativity scores between groups for Instrument A, and to compare pretest/posttest creativity gains in Instrument B.

Limitation 2: Samples of student posttest artworks were limited to nineteen samples in the control group utilizing Authentic Assessment and nineteen samples in the experimental group utilizing Quantitative Data-Driven Assessment. Some student posttest work that had been judged by the expert panelists had been very recently completed and was still in a "green ware" state, the un-fired clay that is very fragile, and still malleable if it is at all wet. Green ware when dry is extremely fragile, and easily broken. Recent kiln explosions during the last week of the treatment lesson due to inclimate weather and other unforeseen circumstances had negatively impacted the quantity of projects in both the control group and experimental group results sample.

In two separate kiln firings, a student had left tarpaper on their green ware project, and covered the tarpaper with clay to hide the remaining tarpaper. It is suspected that in these two kiln firings, the green ware with tarpaper exploded, in such a way that the exploded shrapnel broke many nearby projects in the kiln. See image (x.x)

In spite of the setbacks, students felt compelled to participate in the expert panel gallery exhibit, and had rushed to create last-minute green ware for inclusion into the gallery exhibit for the expert panelists. The green ware was rated, but the data collected from the green ware was omitted from the results for this initial experimental research. The green ware projects were completed under a much smaller timeline, (some within three hours, instead of two to three weeks), and under increased pressure with the rapidly changing ambient humidity levels, kiln firing schedules, and a rapidly approaching deadline to assemble the gallery exhibit for the arriving expert panelists.

With the omission of the green ware projects from the overall initial experimental research panel results data, and the projects that had no pretest data available, nineteen projects remained in the overall initial experimental research panel data in the control group, and nineteen projects remained in the overall data in the experimental group.

Limitation 3: In Instrument A: Expert Panel Posttest Only Experiment, the panel had a few questions regarding the second criteria, a "novel or valuable response to the task". The criteria was defined as novel being "new" to the task, or valuable being "something that can be used" after the task, just as it was explained to the students. However, it is important to note that many student posttest projects were cylindrical in form. The task of the project, pretest and posttest, was to "create a tar paper slab project with a bottom and at least two sides". Many of the panelists contended that the task of the project was not met if the posttest project was cylindrical in form such as a mug or vase, as cylinders have only a bottom and one side: the cylinder wall. This is significant because both the control group and experimental groups exhibited posttest projects that were cylindrical. One project had no bottom, and no side, as the final product was a

hanging wind-chime. The wind-chime and cylindrical-shaped posttest projects were not removed from the data sample.

Limitation 4: Students began to demonstrate fatigue and dissatisfaction with the use of clay for two large projects, sequentially. Toward the end of the second project (posttest) students became increasingly vocal about the frustrations and concerns of repeating the same type of projects. "When are we going to be done with this?" and "When will we get back to drawing?" were frequent student requests during the last few weeks for a transition from the clay medium and into another type of project. The nature of the study necessitated a pretest / posttest comparison. Fridays were regularly scheduled each week as "Sketchbook Fridays" in order to ameliorate any medium-fatigue, and facilitate planning and idea generation time, where students could choose to draw or paint in their classroom sketchbooks, either deciding from a list of ideas or generating ideas of their own. Excitement about the use of clay, and the project tasks at hand made the use of sketchbooks each Friday very rare at the beginning of this study. Toward the end of the study, students were vocally grateful for the break in medium and pace.

Limitation 5: Due to the practical concerns of the student population, and conducting the experimental research within the structure of a classroom, the amount of time allotted for this experiment was limited to nine weeks. Ideally, the experimental research would be conducted over a longer amount of time, perhaps three to four months. With the need for student evaluation, entering grades into the grade-book, and keeping the curricular pace for the academic year, the units of instruction in clay for this study was limited to nine weeks. At this particular school site, there is a modified block-

schedule in which classes are increased in duration for a normal 55-minute class period to 90 minutes, two days per week. Students were also encouraged to visit the Art Classroom during their "Advantage" enrichment course period, twenty minutes twice per week. Also, during the course of this experimental research study, some students stayed after school to work on their projects, a few hours per week, sometimes up to eight hours a week after school. Opportunities were available to students to receive individualized instruction if requested. Still, the obligations and responsibilities of the experimenter within the classroom setting governed the allotted time available to conduct this experimental research.

Discussion of Hypotheses

Instrument A: Expert Panel Posttest Only Experiment

Hypothesis 1: It was hypothesized that an analysis of variance (ANOVA) would determine a statistically significant difference in creativity between the control group utilizing Authentic Assessment and experimental group utilizing Quantitative Data-Driven Assessment (QDDA) posttest only artworks in the consensually panel-defined "Work Synthesizes Ideas in Original and Surprising Ways" with experimental group utilizing QDDA demonstrating significantly lower creativity scores in this category. This was not confirmed.

An Expert Panel of Art Educators scored student artwork from the control group utilizing Authentic Assessment as more creative than the experimental group utilizing QDDA in the creativity category "Work Synthesizes Ideas in Original and Surprising Ways". However, the difference in mean creativity scores between control and experimental groups were not statistically significant.

Creativity score range demonstrated in the control group is greater than the creativity score range demonstrated in the experimental group.

Hypothesis 2: It was hypothesized that an analysis of variance (ANOVA) would determine a statistically significant difference in creativity between the control group utilizing Authentic Assessment and experimental group utilizing Quantitative Data-Driven Assessment (QDDA) posttest only artworks in the consensually panel-defined "Novel or Valuable Response to the Task" with experimental group utilizing QDDA demonstrating significantly lower creativity scores in this category. This was not confirmed.

An Expert Panel of Art Educators scored student artwork from the control group utilizing Authentic Assessment as more creative than the experimental group utilizing QDDA in the creativity category "Novel or Valuable Response to the Task". However, the difference in mean creativity scores between control and experimental groups were not statistically significant.

Creativity score range demonstrated in the control group is greater than the creativity score range demonstrated in the experimental group.

Hypothesis 3: It was hypothesized that an analysis of variance (ANOVA) would determine a statistically significant difference in creativity between the control group utilizing Authentic Assessment and experimental group utilizing Quantitative Data-Driven Assessment (QDDA) posttest only artworks in the consensually panel-defined "Work Is Improved From Pretest to Posttest" with experimental group utilizing QDDA demonstrating significantly lower creativity scores in this category. This was confirmed.

An Expert Panel of Art Educators scored student artwork from the control group utilizing Authentic Assessment as more creative than the experimental group utilizing QDDA in the creativity category "Work Is Improved from Pretest to Posttest". The difference in mean creativity scores between control and experimental groups were statistically significant.

However, it is interesting to note that the creativity score range demonstrated in the control group is lesser than the creativity score range demonstrated in the experimental group. In all other creativity categories for Instrument B, the control group demonstrates a greater range than the experimental group.

Hypothesis 4: It was hypothesized that an analysis of variance (ANOVA) would determine a statistically significant difference in creativity between the control group utilizing Authentic Assessment and experimental group utilizing Quantitative Data-Driven Assessment (QDDA) posttest only artworks in the consensually panel-defined "Work Is Original From Others In the Class" with experimental group utilizing QDDA demonstrating significantly lower creativity scores in this category. This was not confirmed.

An Expert Panel of Art Educators scored student artwork from the control group utilizing Authentic Assessment as more creative than the experimental group utilizing QDDA in the creativity category "Work Is Original From Others In the Class". However, the difference in mean creativity scores between control and experimental groups were not statistically significant.

Creativity score range demonstrated in the control group is greater than the creativity score range demonstrated in the experimental group.

Instrument B: Creativity Pretest/Posttest Gains Experiment

Hypothesis 5: It was hypothesized that an analysis of variance (ANOVA) would determine a significant decrease in creativity in the experimental group utilizing Quantitative Data-Driven Assessment (QDDA) from pretest to posttest demonstrated in Teacher Evaluations in the creativity category "Synthesis of Ideas In Original and Surprising Ways". This was not confirmed.

Creativity gains as demonstrated in student artwork from the control group utilizing Authentic Assessment as more creative than the experimental group utilizing QDDA in the creativity category "Synthesis of Ideas in Original and Surprising Ways". However, the difference in creativity gains between control and experimental groups were not statistically significant.

Hypothesis 6: It was hypothesized that an analysis of variance (ANOVA) would determine a significant decrease in creativity in the experimental group utilizing Quantitative Data-Driven Assessment (QDDA) from pretest to posttest demonstrated in Teacher Evaluations in the creativity category "Novel or Valuable Response To The Task". This was not confirmed.

Creativity gains as demonstrated in student artwork from the control group utilizing Authentic Assessment as less creative than the experimental group utilizing QDDA in the creativity category "Novel or Valuable Response to the Task". However, the difference in creativity gains between control and experimental groups were not statistically significant.

Hypothesis 7: It was hypothesized that an analysis of variance (ANOVA) would determine a significant decrease in creativity in the experimental group utilizing

Quantitative Data-Driven Assessment (QDDA) from pretest to posttest demonstrated in Teacher Evaluations in the creativity category "Work Makes Student Ask New Questions to Build Upon an Idea". This was confirmed.

Creativity gains as demonstrated in student artwork from the control group utilizing Authentic Assessment as more creative than the experimental group utilizing QDDA in the creativity category "Work Makes Student Ask New Questions to Build Upon an Idea". The difference in creativity gains between control and experimental groups were statistically significant.

Hypothesis 8: It was hypothesized that an analysis of variance (ANOVA) would determine a significant decrease in creativity in the experimental group utilizing Quantitative Data-Driven Assessment (QDDA) from pretest to posttest demonstrated in Teacher Evaluations in the creativity category "Enables Student to Discover, Learn Something Not Directly Instructed". This was confirmed.

Creativity gains as demonstrated in student artwork from the control group utilizing Authentic Assessment as more creative than the experimental group utilizing Quantitative Data-Driven Assessment in the creativity category "Enables Student to Discover, Learn Something Not Directly Instructed". The difference in creativity gains between control and experimental groups were statistically significant.

Implications of Employment of Quantitative Data-Driven Instruction and Assessment in the Visual Arts

The most important finding of this initial experimental research is that the employment of quantitative Data-Driven Assessment in the Visual Arts demonstrates a decrease in creativity, defined as "Work Synthesizes Ideas in Original and Surprising

Ways", "Novel or Valuable Response to the Task", "Work is Improved from Pretest to Posttest", and "Work Is Original From Others In Class", however statistically slight in most creativity categories. The range of creativity scores also decreases in most creativity categories when Quantitative Data-Driven Assessment is employed. The dependent variable, the posttest assessment motivation appears to be the fundamental affect upon the creativity results in both instruments. Since the aims and pedagogies of the Visual Arts overall are to encourage divergent thinking, to increase creativity and innovation (Zimmerman, 2010b), the results of these experiments demonstrate that the assessment motivations employed in the use of quantitative and convergent Data-Driven Instruction and Assessment are counterproductive for desired outcomes for student learning and achievement in the visual arts. Further testing of the implementation of Quantitative Data-Driven Assessment is highly appropriate prior to mandating the implementation of such assessments.

Based on the research findings of this initial experiment, it is the opinion of the experimenter that additional discussion and research within the education community and within the Art Education community should occur to clarify the necessity of practicing and demonstrating creativity in the Visual Arts. Furthermore, the intrinsic motivation and extrinsic motivations involved in creativity assessment methodologies likewise require additional research and discussion.

APPENDICES

APPENDIX A

DISCUSSION BOARD “A” RESPONSES< CONTROL GROUP

ID	RESPONSE	LINK AND COMMENTS
AL007	Creativity comes from the flow of piled-up knowledge of art such as technology to structure design and pottery to manufactured goods. Experiencing creativity is something way absolutely beyond my dreams and it always has me at "wow!" Creativity is a VERY major and inspirational factor to the world that leads an age of outstanding technology and many other things.	http://designyoutrust.com/2012/08/creative-inspirational-street-art-1/ (Links to an external site.) Here I have attached a link about inspirational street art that shows a few original 3-Dimensional drawings by talented artists on the streets. The reason why I think this link (the paintings) is full of creativity is that there are realistic shadings of highlights and shadows and SO many more countless things, such as techniques, which all comes together to create a massive image.
HB033	To be creative is to turn new ideas into something equally interesting and realistic. It is also the ability to identify the world around you and solving the endless problems in different ways. So basically being able to think out of the box. When I	http://www.pinterest.com/ The link that I chose expresses creativity by letting people from around the world show their creativity through writing, blogs, artwork, pictures, etc. and it enables others to learn from other people. Also it inspires people to find

	experience creativity it normally just comes to me while watching shows that I like and when I find art that pops out to me. I then create it into something original that I come up with later one, which normally inquires mashing different art ideas together.	new ways to recreate old things. Oh and I would also think as deviantART as a good website to show creativity. It is basically like pinterest.
PC063	Creativity is "thinking outside of the box" and going above and beyond during anything. This means to not do something that anyone else could do and be original to yourself and your ideas. Creativity is not being boring and making something boring into something unique and original.	http://www.pinterest.com/raventracks/abstract-art/ (Links to an external site.) Abstract art is being creative by turning what you see into something wildly imaginative and creative. Also pinterest is a website where people can express their creativity and inspire others.
YP035	Creativity is something you make up in your mind that isn't simple and unique. When I experience creativity, I think of something on my mind and I combine it with the	http://www.creaktif.com/

	task on hand.	
JL057	creativity is defined as the tendency to generate or recognize ideas, alternatives, or possibilities that may be useful in solving problems, communicating with others, and entertaining ourselves and others. when I experience creativity it is really interesting because, I can imagine or draw something that is impossible. Also I don't want to draw common things I want to draw more unique things.	https://www.youtube.com/watch?v=KtcoUNlaO4s (Links to an external site.) I think this is very creative art to me because,3D painting make a street look eye catchy and a complete distraction Also,3D Street Art Paintings look fantasizing and dreamy.
RL005	Creativity is freedom to express yourself in any way your mind lets you. When I experience creativity, it feels good because I can do whatever I want.	http://www.youtube.com/watch?v=l2KSPiTOMR8 (Links to an external site.) I think that video is creative because it allows them (the person) to make fun of the trailer while entertaining us (the audience).
NM039	In my opinion, creativity is using your imagination, including your own thoughts and idea, to create	Link (Links to an external site.) - I think this artwork is creative, because the artist used a human face with its

	different types of artwork. When I experience creativity, I feel *free* to create different types of art by using my own imagination, thoughts, and ideas	features in their artwork and creatively made it all fit together to create a realistic piece of art
HH027	Creativity is when a person uses their imagination and have fun with their artwork by adding different types of colors that shows your feelings. Feelings are a big part of art to me because most of the time when people make art they use real life experiences or memories to really have a meaning in it. When I experience creativity I do it in my art and in many other ways but when I do paint or sketch things that I love like sunsets or my memories and reflect on it my feelings towards it.	http://www.youtube.com/watch?v=NqedBekgLdo (Links to an external site.) In this video I think It is very creative because it is quite unique from other types of art. Other art wouldn't be painted on water and afterwards be reflected onto paper. To me I just think it is unique and different and that's why I like it.
AN021	Creativity is something that is unique, you don't copy anyone that you think has a good idea. It is	Here is a link to a picture I think it is creative because when I saw it, I questioned why there was a dog being

	something that you come up with yourself and not taking any ideas or suggestions from anybody. When I experience creativity, I think of imaginative because in order for someone to make something creative, they have to think about it first. So that person has to imagine what they are going to make or do.	held up by balloons and then started using my own creativity to come up with a story to explain how and why. http://www.google.com/url?sa=i&rct=j&q=&esrc=s&frm=1&source=images&cd=&cad=rja&uact=8&ved=0CAcQjRw&url=http%3A%2F%2Fitsmyviews.com%2F%3Fattachment_id%3D9288&ei=IO1LVJ-nJcLj8gHQoYDIDg&bvm=bv.77880786,d.aWw&psig=AFQjCNEjvzkY1cJLCub62-0NsGIkdbNhCQ&ust=1414348407755270 (Links to an external site.)
GC043	Creativity is when ideas are put into the physical world from the artist's imagination. It is important that it is supposed to be original and come from the mind. When I experience creativity, I feel free since I can put whatever I think onto paper using whatever I want, pencil, pen, etc.	

	The image below in my opinion is creative, since it gives me the idea that our minds can create something colorful and creative, and still retain the idea of imagination.	
EF055	Creativity is the ability of you being able to think of your own new and unique ideas. When you experience it you can make it in your head and know what to do.	I think the link below is creative because this artist came up with his own idea to do these 3D paintings and paint them in layers using resin. http://www.thisiscolossal.com/2013/04/three-dimensional-animals-painted-in-layers-of-resin-by-keng-lye/
JT029	Creativity is the use of imagination and original ideas, to make something new. When I experience creativity it is something that catches my eye, something I have never seen before, that is new to me.	http://forum.xcitefun.net/creative-art-on-plates-t83446.html (Scroll down a little.) I think this is creative because the art work uses unlikely objects to create an image that relates to something else. This is a very original idea. (Links to an external site.)
AD017	Creativity is when someone expresses their ideas to the world. The way they express their creativity	http://www.youtube.com/watch?v=5cBrM2syccU&list=UUqxKavbK7Sx-daJqZBLsgog (Links to an external

	can be in many, many ways. Creativity is different for every person. When I experience creativity I feel empowered because I am putting my ideas into the world and making a, even if it isn't very big, difference.	site.) I think that the person who made this design is creative. I think so because I know how difficult it is to come up with designs yet this person does it with ease. Also by making a video showing people how to create the design they are sharing their creativity with the world. I also think it is creative because if a normal person were to look at what was made this person made they would most likely say "wow how did you make that?" That is why I think that design is creative.
SK045	Creativity is art that is "out of the box" of unique. Creativity does not always have to be the best artwork. It can be a title font or anything else. Creativity allows variety of things such as different houses and cars. When I experience creativity, I feel very proud of my work and	https://www.youtube.com/watch?v=De4KEvIUn2c (Links to an external site.) this is a video of street spray paint art. This is very creative because this man uses different tools to make shapes even and sharp

	accomplished. It may not always look good but it definitely expresses my thoughts.	
IL051	Creativity is the art of expressing what you feel and what you imagine, through your artwork. When I experience creativity it makes me feel good and accomplished. I feel as if I can show exactly what I am feeling through designs and patterns.	I think the painting in the link below is creative because it tells a story and is beautiful in its own way. http://www.daydaypaint.com/images/Print-Painting/Abstract-Painting-011.jpg (Links to an external site.)
SJ047	Creativity is when your mind is used in an outside-the-box way. Creativity can be sprouted from anything, such as other people , your interests ,your happiness, and even fear or hate. (and anything can be the result of creativity) When I experience Creativity, I usually feel captivated by the thought, and want to grow the idea into something	Example of creatvity: http://www.youtube.com/watch?v=PjnMFqnGdac (Links to an external site.) _ This is a video that shows the making of a costume that is based off of a game called Animal Crossing. I feel like this video shows creativity because she (Commander Holly) is creating something inspired from one of her interests, something that

	bigger.	required thinking, because she is bringing something that exists in a 2-d world to the world we live in.
CK067	Creativity is a way one self expresses themselves in any way shape or form	
JP059	Creativity is something or some idea that is created by an individual which expresses his or her uniqueness. In this theory, anything can be creative, also long as it is unique to the artist and is true to him or her. For me, experiencing creativity is making something that express who I am and something that is different and not overly used. That would be a type of happy and cheery kind of artwork. Creativity is all about the perspective and opinions of the artist, but also the audience.	http://upload.wikimedia.org/wikipedia/commons/d/dd/Labille-Guiard,_Self-portrait_with_two_pupils.jpg (Links to an external site.) To me this painting is very creative. When this is first overlooked, people wouldn't see it as creative. Because this type of artwork is so overly used, it seems very plain, but to me I find it very creative. To see it, we must changed our perspective and go back in time when paintings were the only type of photographs people had. During this time these paintings were new and different from the old medieval paintings. This is why so many people

		recognize this kind of artwork.
FG013	I believe creativity is the ability to create. Hence, the ability to create is the ability to form, to design, to construct, to generate, to organize, to invent, to discover and even just to plain plan, anything. From the way one may hold their paintbrush to the invention of a new computer, any person can obtain creativity for anything their mind desires.	Thus, I decided to attach an image of the world, exemplifying the idea that everybody on this earth resembles and is able to acquire creativity. However creativity is not always positive, because creativity can also be portrayed as ideas of war, or plans of conflict against one another. This is why I put the earth as what I perceive is creative. To show the vagueness of how general creativity is and what it can be. Screen-shot-2013-10-31-at-18.13.53.png (Links to an external site.)
JL061	Creativity is colors of imagination pieced together. For me using my creativity is like using imagination in pictures on paper. I think it's creative because your imagination is how you determine something by	.https://www.youtube.com/watch?v=g857UNIKQsM (Links to an external site.) I think this video is creative because she is using the colors from her creativity and creating a face of many

	yourself and what to make out of your thinking	colors. As well as using a tiny bit of imagination because the figure is not a regular face it is expressed with many colors of shades.
PR025	Creativity is the use of ones imagination based on their own unique style and thought process. When I see something that inspires me, I become creative. To me, creativity is everything. From the design of a building to the murals on the wall.	http://logopond.com/ (Links to an external site.) This website is creative and makes me want to create a logo myself. Luckily, you can! There is a spot where you can design your own logo.
EC037	Creativity is the ability to think of new ideas and make new things. Creativity to me can be doodling random stuff. Sometimes, creativity is a hard concept.	This is my example of creativity because it is a doodle sketch. http://www.needlenthread.com /Images/patterns/Embroidery_Doodles /doodle_design_02.jpg
EM053	Creativity to me means imagination we wouldn't live without it. when I experience creativity I try to think open-minded and unique	. I think this pic would be a good example of creativity because someone used their imagination and it looks unique.
CG023	I believe creativity comes from	No link provided.

	the heart, the mind, the soul. What I mean is, creativity is when you have the power to do what you want on a canvas, a essay or in your actions.	
YL009	Creativity is making each individuals different, because every people have different ideas. For me, when I make something very different or unique, I feel like I experienced creativity. _	I felt this is creative, because when the person in the video was making the bowl on the wheel, he used his fingers to make the flower-shape bowl, which I thought it was special, because it was not just a simple ordinary bowl. https://www.youtube.com/watch?v=qz667FhL9-M (Links to an external site.)

APPENDIX B

DISCUSSION BOARD "A" RESPONSES, EXPERIMENTAL GROUP

ID	RESPONSE	LINK AND COMMENTS
SK042	Creativity is a spark of your imagination, something original! When I experience creativity, it's fun! Not much erasing... not being creative is being like copying down a report that someone else wrote - boring! How many people have been asked to duplicate a real life apple on a sheet of paper? Experienced or not, it's still frustrating and some people just toss their hands in the air in annoyance	. http://www.zazzle.com/cloud_puking_rainbow_card_post_cards-239306030289591130 (Links to an external site.) This artwork is creative since it is fun and seems to be out of imagination and dreams, not from the real old world.
MB040	To me creativity is simply when you create ideas or use your imagination. When I am being creative it's like solving the universe's questions in as many ways as possible.	http://businesshacker.co/wp-content/uploads/2014/02/creativity.jpg (Links to an external site.) I believe that this is very creative because of what they used to make into art and the idea behind it.

CA004	Creativity is what every artists needs. When I first experienced creativity was good to know how to do all the work you can think of.	Pinterest.com is creative. It's creative because of how you will see different art works that other people have created.
SK046	Creativity comes from what you do. When you are trying to make a painting, sculpture, or anything you add creativity to it.	http://www.youtube.com/watch?v=1NXcZWxBGSA (Links to an external site.) I think this video is very creative. I like how she used crayon and glued them on a board and then she melted them to make them look like rain.
RA010	creativity is a unique drawing, imagination or a item that has lots of designs. when I experienced creativity it was like experience a whole other part of you.	(no link recorded in student response)
JH056	Creativity is an idea of being original and unique. Whenever I tend to be more creative, I make or draw things that you would not	http://cubebreaker.tumblr.com/post/100874700586/visual-artist-alice-pasquini-completed-this#notes (Links to an external

	expect me to make/draw, just like everyone when they experience creativity. The artwork shown in the following link is very creative because the artist chose not to draw on a plain sheet of paper or anything that artists usually use to draw on.	site.) The artist also decided to draw "in memory of late poet Alfonso Gatto" which is creative and interesting because the poet himself is not a widely known person and not a lot of people would draw in memory of any poets.
AL014	For me, creativity is anything you can imagine or thinking beyond. When I experience creativity, I feel amazed at what I couldn't think about and excited because imagination never stops.	http://4.bp.blogspot.com/-z_RBev08qCA/TiGSGyZlVjI/AAAAAAAAAGg/iLQntmUwvw0/s1600/Awesome%2BCollection%2BOf%2BImagination%2BArt%2BWork..jpg (Links to an external site.) I think this picture is creative because there are so many colors in it and imagination was everywhere, the designs were something I never seen before.
IN006	I think creativity is using your imagination or own original	I think this link is creative because instead of going out and

	thoughts or ideas. When I experience creativity I keep on having one idea after another. For the most part, I also normally have almost everything thought/planned out how I want it.	spending money to solve their problems, they're being creative and finding easy, simple, and cool solutions that work just as well (or maybe even better than a bought product). http://www.buzzfeed.com/alannaokun/crafthackz
CM022	Creativity is something that stands out, that is original, that is like nothing ever seen before. When I experience something creative, I think it is really awesome because I have never seen something like it.	http://inspirationfeed.com/articles/design-articles/5-awesome-optical-illusions-with-impossible-objects/
JL020	Creativity is to be able to express yourself or something freely. It can also just be allowing the ideas in your head and putting it into reality. Also it is something unique in your own image. it	. http://www.youtube.com/watch?v=sIgFAXcdVAI (Links to an external site.) This video shows how this spray painter artist is being creative and unique with his mind. Also he is able to use

	maybe not be perfect but its creative. . Everything around us is creative. What it is like for me when I experience creativity is that I'm able to express my own ideas and be able to think of new ideas in my head freely. To be able to be able to put my ideas and be unique	what he has to be able to make what he wants to make.
LG066	Creativity is when you use your imagination to come up with original ideas. Or, you can take other concepts and apply parts of them to your own piece of work to create something unique. When I experience creativity, I have a sudden burst of imagination that comes to my head and I have to write down my idea before I forget it.	. http://24.media.tumblr.com/tumblr_lcxij3c9NX1qzlgueo1_500.png (Links to an external site.) I think that this photograph is creative because it has special way in showing what it is trying to express. You can see that everything else is blurred out except for the sign, so you can focus on the words "One Way or Another". The blurred out background shows cars on a busy street in the city, which helps

		symbolize the words. Also, the filter that has been applied to the picture makes it bright and colorful so it catches your eye and is pleasing to look at
AF030	Creativity is when you do something out of the ordinary and its something that your mind does when it he use of the imagination or original ideas is displayed like in a art work piece or drawing of some sort. For me I get motivated it make more creative things and that is what sparks my imagination.	http://hovercraftdoggy.com/2013/01/18/we-pin-up/
HS064	Creativity is the essence of problem solving, curiosity, science, art, and many, many other things. When I experience creativity, I feel as if I must immediately write or draw my idea immediately.	Here's my link: 180px-14331_view.jpg (Links to an external site.) Toothless, from how to train you dragon. The books, just so you know. I love the movies too, though. c0085950_50c97a2d49f5

		7.jpg (Links to an external site.) Hobbit! yay! marvel-studios-avengersbg-logo-img.jpg (Links to an external site.) lastly, Marvel! Yay Avengers and X-Men!
JH032	Not sure what the rest of you did since I can't see the rest of the responses. Harry shows his story through the narration. His dance with pigments correspond to the narration. Each color represents a emotion that builds up in his life time. By the end, he is a mess. But with the colors, he takes advantage and makes the best of it, decides to make the colors who he is today. It shows his life in another way besides telling or showing. creativity is something that everyone is born with. it is the skill of simply picturing	https://www.youtube.com/watch?v=elILetNPyr4 (Links to an external site.) Link above.

	things in your mind. Everybody has it, even if he/she/it can't show it physically. I can't say much more than that, I can't think of anything else I'm a little sleepy.	
DF068	Creativity is a type of way you use your imagination to make art or anything else. When I experience creativity I use my imagination	. http://www.art.com (Links to an external site.) , is what I think creative is because their are so many pieces of artwork that show different techniques and colors
AM048	Creativity to me is expressing the mind and implementing images on to a canvas or something. When I experience creativity I let go of all thing I was thing about.	This picture shows that the right side of the brain is what you use for your art. I think it is creative because its colorful, and it has the other side too.
MM050	Creativity is using your imagination at anytime and when I experience creativity, it's exciting	. Link (Links to an external site.) I think this photograph is art because it has amazing colors and the photography is beautiful.
DE002	Creativity is something new and	I was going through the internet

	meaningful. I sometimes get these bursts of creativity and start sketching my ideas out! Sometimes, my creativity switch is on "off" and no matter how hard I try, I simply can't draw anything that worth finishing (I have so many unfinished drawings!).	recently and I found a drawing that I completely fell in love with!!!! It' called Liquid Life by Kirrui: http://www.deviantart.com/art/Liquid-Life-471103385 (Links to an external site.) You HAVE to check it out!!!!

APPENDIX C

DISCUSSION BOARD "B" RESPONSES, CONTROL GROUP

ID	STUDENT RESPONSE
MB040	My project is going to be like a piggy bank, and because it will be square I really want it to seem like an actual pig so my texture will be kind of smooth but mostly cracking and realistic.
CA004	My next tar paper slab project is going to have patterns like a diamond shape surface around it.
DE002	I plan on making the spots on my giraffe shaped like triangles! I might glaze them red to make the giraffe more colorful.
AF030	For my next slab project I will have scale like patterns for a vase or a box.
RA010	I'm going to make a tall vase. The structure of the surface is going to be a pattern with lines and sketches.
SK046	For my next tar paper slab project is going to be a vase that will have patterns and lots of ridges it will be rough and bumpy.
JL020	What I am planning to do is make a mug or a cup and make like zig zag and star shaped designs on it or do like a curly swirly line around the cup and stars around it.
CM022	My project is going to have a surface texture that is like the bottom of my shoe so it will have a zig zag design.
JH056	I am planning onto making a cup and using a carving tool to carve flower patterns into it.
IN006	For my next Tar Paper slab project, I am going to carve the outlines of

	building (like a silhouette) onto a box. My goal is to make it look like a city at night.
BP044	For my next tar paper slab project, I want to make a box, not a boring one but one that has all different kinds of stuff and patterns on it. I want it to be very colorful, and have vines going all across it in different directions.
KD024	For my next slab project i want to make a box with engravings of words on it.
LG066	For my next tar paper slab project, I am planning on carving out a picture rather than just painting with the glaze, which is what I did last time
DB054	For my next Tar slab project since I'm making a skateboard I'm going to make the surface of it rough and grainy
SK042	For my next Tar Paper slab project, I am considering a smooth, sea shell-like surface or a rough, sand-like surface on a cookie. To specify, the chocolate chips might have that smooth surface whilst the crumbly part of the cookie (the dough) might have the rough surface
SK060	For my next tar paper slab project, my idea is to create a cylinder shaped jar with water drop designs on the surface.
DF068	For my next Tar paper slab project I am going to have diamond, swirls and scales on my cup.
AL014	For my next Tar Paper slab project, I would have all different kinds of flowers for the surface treatments, to see how all the flowers together look.

APPENDIX D

DISCUSSION BOARD "B" RESPONSES, EXPERIMENTAL GROUP

ID	RESPONSE
JT029	I am going to have scales on another, taller, box. Scales that overlap each other and look like fish scales. I also might have a lined diamond pattern on the inside
PR025	For my next project I am going to do a box/vase that will have shell patterns on it.
JP059	For my next tar paper slab project, I would like to make a jar but with prints that would represent my personality. Rather than prints that go inward, I would like to make prints that stick out giving it a nice texture. I could add different emojis on the outside sticking them with slip such as the smiley face or the poop emoji.
HH027	For my next tar paper slab I will definitely consider using the techniques that I have learned for the past week or so and just have and make my project unique and nice. I might create an elephant and outline the features on there. Like patterns and different shapes.
HB033	For my next Tar Paper slab project I was thinking of making a clay book cover for one of my book series and I would have to make the slab really thin if I want to glue it to a hard cover book or other object. I would maybe print an image of that book and put it on the cover, so I would be using image transfer on to my bisque ware. If that does not work I will try to make a clay book and again I will use image transfer for the cover.

EC037	For my next tar paper slab project, I am thinking of carving shapes instead of drawing it in with the glaze on my previous project. Also, I want the corners of my next project to be round so I will use a sponge to wipe it down.
NM039	For my next tar paper slab project, I have considered using techniques, such as carving, glazing, and application. First, by using the carving technique, I could cut out a design from the surface of the clay. Next, by using the glazing technique, I could cover my project with a shiny coating. Lastly, by using the application technique, I could paste an object or image onto the clay's surface.
CK067	I consider doing carving and engraving
YL009	For my next Tar Paper slab project, I am going to make a candy box that can be opened and closed. Rather than carving the shapes what I did this time, I am thinking to put clay on it, like in the video that we watched in the class. (Using the slab to draw on the project, like using it for the cake decoration.) With that tool, I want to draw a mustache on my project.
AL007	For my next Tar Paper slab project, I would like to create a tall vase with geometric patterns such as triangles, circles, and diamonds to represent the plain-ness which I like. I would also make the shapes pop out and make it "realistic" rather than just glazing it but with shades and highlights.
RL005	For my next tar paper slab project, I will make some indents into the clay and they glaze those different colors.

TK031	My project is like a cup with writings and strips around it with stars.
FG013	I'm planning to design a boxed type of vase, with each side as square tiles with mosaic and tile incorporated designs.
AD017	For my next tar paper project I'm thinking of making the clay look like bark from a tree. I may also want to make the clay look like it is made of scales.
GC043	For the next Tar Paper slab project, I will consider giving it a texture similar to smooth rocks and indented cracks on the surface. I will make it look like a volcano.
SK045	I am considering making a pineapple. For the texture, I figured out that using the bottom of your hand while it is in a fist creates a texture that looks like the pointy part of a pineapple.
SJ047	For my next Tar paper slab project, I would like to make laptop. One of the surface decorations I am considering is carving in many little keyboards instead of painting them on with glaze.
IL051	For my next Tar Paper slab project I am considering making a large bowl and using triangular patterns to design it. The triangles will line up side by side to make a cool pattern effect at the top and bottom of the bowl.

APPENDIX E

DISCUSSION BOARD “C” RESPONSES, CONTROL GROUP

ID:	RESPONSE:
MJ074	Trying to make all sides with tar paper on it as equal as possible and flatten the inside and out more. And maybe even putting borders or edges on the sides
NH034	make the sides even
JH056	For my next project, I'm going to put more surface designs and make sure the surfaces are smooth and even. Also, I would make it more sturdy.
SK046	To make my tar paper slab project more creative I will put more surface designs and try to make the sides very even, and also take my time so my project won't explode.
JH032	I will try to make it a concave, not something that is open air, like a box. By something concave, I mean like a vase, that passes the imaginary vertical line twice.
MB040	I will attempt to make more surface decorations and use multiple glazes to color the outside
LG066	I plan to improve my tar paper slab project by making the slabs more even and scoring better. I also plan on using glazes to create more detailed paintings as well as other surface treatments.
RA010	I plan to improve slab project by taking my time and smoothing out my clay.

DB054	I am going to add more scorings and make everything fit together
AF030	I am going to improve my tar paper slab project by sketching it out better and I am going to put patterns in my slab project and come up with a different shape then just making a box or mug.
CK012	I will make my tar paper slab project better by making the sides even and put a better design and glaze it different colors
AL014	To make the second one more creative than the first, I would add more interesting surface decorations and make a different shape than just an ordinary box.
SM036	I plan to improve my slab art project by using the slip properly so that it wont break again unlike all four of my other ones.
MM050	For the next tar-paper slab project I will try to make the sides even and carve more details into the clay. Also I would like to make something that is more creative than just a box because now I have more experience.
DF068	Make the sides rounder.
JS018	I plan to improve my project by giving it more color and a eye popping design.
CA004	Make all the sides even to hold up your design
JL020	how i will improve my tar-paper slab project is by making the sides more even and more creative like the designs on the project. also i would make sure to take my time on this second project.

DE002	I will try to make another giraffe that will stand better and have a much smoother surface. I will also make it very colorful.
CM022	trying to add more designs and make it smoother and flatter
AM048	I can improve my art slab project by making it by my self with out tar paper
RA010	I'm going to make a vase with designs on it
SK060	I plan to make my tar paper slab project better by evening out the sides and smoothing the surfaces. I will use a ruler and measure the size. Before firing my work I will make sure to find any cracks, dents, or holes.
SK042	I plan to improve my tar paper slab project by putting more creativity into it and more care. My last tar paper slab project was rather simple and I spent most of the time trying to keep things together and trying to not snap my project. So, instead I will: 1. more expressive than a cookie (literally) 2. more originality than a brownie (literally) I'm making a blooming flower with a fox playing in the middle, which is better than the cookie and brownie I made last time.
NL076	Four sides even and more creative with my designs and colors.
BP044	I'll try to make the sides more even, and not have some of the parts fall off my project.

APPENDIX F

DISCUSSION BOARD "C" RESPONSES, EXPERIMENTAL GROUP

ID:	RESPONSE:
AN021	To make the project more creative, you can add more sides to the project or have the project be rounded on the outside. It can also be made in different sizes, shapes, and color.
CG023	I would not rush and take more time making it perfect. When i didn't take my time, my pot blew up. Also I would be more creative with my ideas because my last one was bad and lazy.
CE015	Making all the sides even, and scored better.
EF055	I would take my time and make sure that all edges are cut precisely and all sides are even. I would also make use of the slip more to make sure my project sticks together better.
GC043	Next project, I will make the tar paper more equal and even. The clay will be cut more evenly and be more form fitting.
NM039	Since we've been investigating new techniques, I am going to make my second tar paper slab project more creative than my first by creating a different structure than my first, using tar paper to reinforce the joints of the structure and some of the surface techniques that I learned about, and using time wisely to perfect the color and shape of my project so that it wouldn't look as if I had rushed through it.
PR025	I plan to make it better by making exact measurements on the tar paper so my squares would be the same size. I would also make something

	more than just a box since I know how to do it now.
FG013	I am going to add more detail and preciseness to my next tar paper slab project, by refining the edges and smoothing out all sides to ensure evenness.
AL007	For my next tar paper slab project, I plan to improve on creating a simpler but professional project than the first one which cracked into pieces since I spent too much time on it before first firing. I secondly will try my best to make my tar paper pieces more accurate in shape and size than my first one which was hard to work with. I would also use some clay decorating techniques such as glazing or carving onto my next project.
HB033	For my next tar paper project I plan on making all the sides more even and come up with a better idea on what to make. I might also make the construction a little bit neater and try to use image transfer on to my bisque ware.
MW011	I would check for cracks and holes before firing it. And maybe being more creative with the project instead of making one huge boring box.
HH027	For my second project I will probably try to be creative then just having a cup with just one boring color but instead I can make carvings or any other techniques I learned in the past few weeks.
SJ047	-Try out more ways to use tar paper -surface decorations -more

	different shapes -color schemes maybe -different techniques with glaze
YL009	To improve my tar paper slab project, I will be more focused on the shape, to make the good circle shape, not just focusing on brushing the project. To make it more creative, I can make the mug's base unique, like heart shape or star shape.
RL005	I would make mine a better shape. I won't make it such a box-type shape, but circular.
PC063	I could add more detail on the leaves or maybe make the shape of the container more unique as appose to just a rectangle.
YP035	Next time, I will the make the sides even and try not to have any cracks in my art.
IL051	I'm going to make my second project more creative than the first by making my slabs of clay more neat and by carving in designs and painting them with different colored glaze.
JP059	Next time I do this project, I'm going to add more texture to make my work come alive and to really reach out to the audience. I also want to manage my time and not make some too big otherwise it would harden as I put it together and it wouldn't even come together.
TA001	make the sides even and make it a good shape
HS041	Instead of just a plain box, i will try an more intricate design. I will also try to give the pot a texture.

AD017	I'm going to make my second slab project more creative by adding a variety of glaze colors and a a design on the outside of the project .
JL061	I'm going to make my sculpture more creative by adding more curves and swirls into my project on the outside.
AG019	I'm going to make a normal box, but I'm going to cut holes in the shape of playing card symbols in the middle of each side and add slip trail designs around the holes.
CK067	I am going to focus more on details and color scheme on this next project and make it look neater and with a bit more symmetry
EC037	I plan to carve shapes into my next project. I might also do slip trailing on more project to make it more creative
JL057	Make all sides even and try to think which design would be more creative.(not cylinder or box etc..)

APPENDIX G

TARPAPER LESSON PLAN

CLAY Construction- starring…. TAR PAPER!

Vase / Abstract Vessels

with Amy Cranfill ***http://www.amyswindowseat.com***

and Stephanie Pickens ***http://www.stephaniepickens.com/***

MATERIALS- Clay, canvas, newsprint (to draw templates), TAR PAPER, pencil, plastic bags, wood, brayer, clay knife,

RECYCLE HINT- *Tar Paper is recyclable!!* Call your local Waste Transfer Station for details.

Construction Procedures-

1. Design, Draw, Cut Out the template. Make sure you identify each side with an appropriate letters or numbers – so that you understand what sides connect together. Don't forget the bottom piece- which is a combination of the bottoms of all your side pieces.
2. Trace your templates onto the tar paper – you can use a pencil. Don't forget to label your new pattern pieces with the corresponding letters or numbers you used to identify the sides.
3. Cut out your new pattern shapes from the tar paper using scissors.
4. Create your clay slabs by throwing, or rolling you clay out (use ¼ inch dowel rods for guides). These slabs need to be big enough for all your pattern pieces to lay out on the surface.
5. Next step is to attach the Tar Paper to the clay. First spritz the surface of the slabs with a spray bottle- you don't want water to pool, just enough to dampen the surface.

6. Lay the tar paper on the surface and use a brayer to press the tar paper into the clay- you don't want to press too hard and thin out the clay.
7. Use a clay tool to cut the clay around the tar paper pattern. LEAVE THE TAR PAPER ON THE CLAY! Now you have all the pieces to your vessel!
8. TRICKY PART COMING! Lay all your pieces so the tar paper in side DOWN. The sides of your pieces need to be beveled so that they will come together smoothly. I use a clay knife or Xacto. The bevel needs to slant down to the tar paper at a 45 degree angle. Do your best- it's a practice makes perfect technique. Do all the edges of your pieces EXCEPT the top edge which will be the lip of your vessel.

9. ASSEMBLY- use normal slip and score procedures to connect the edges of each piece together. Trim the edges of the tar paper if they prevent the clay from sealing together because of overlapping.
10. Use a wooden spoon or paddle to gently smack the edges together. I also recommend reinforcing the inside sealed edge with a thin coil of clay. Smooth the coil into the crease.
11. Allow your project to dry slowly. As the clay becomes leather hard, the tar paper will begin to peel away. Now you can add cut outs, designs, and textures –clean up your work and let it dry!






APPENDIX H

PRETEST CRITIQUE AND ASSESSMENT

Ceramics Critique 1

Part of the learning experience in creating art is being able to analyze the work. By taking time to study a piece of art and express your thoughts about the strengths and weaknesses of the work, you will develop a better understanding of what appeals to you and what does not. The things you write for this critique should **demonstrate thought** and need to be **written in complete sentences.**

Title of your work:

_____

Dimensions:

Height:_____"
Width:_____"
Length:_____"

Glaze Used:

_____

Draw (or paste an image of) an accurate picture of your finished work above.

Meeting Project Requirements:

- This project had specific requirements. How did you meet the requirements?
- How did you fail to meet them?
- How did you exceed the basic requirements?

Construction Techniques:

- What method(s) did you use to construct this project? Any special techniques used?
- Did you have any construction/craftsmanship problems? If yes, how did you solve them?
- What do you need to do to improve your skill level?

Time Management:

- The quality of work you do reflects the time spent on it.
  How does this piece reflect the use of your time?

Project Success:

- What is specifically successful about your project?

- What part are you the most proud?

- What could be improved if you were to recreate your project?

Creativity Criteria	Describe how you did or did not do this criteria in your project:	Rate Your Work 0 - 5	Teacher Rating 0 - 5
Does your work synthesize ideas in original and surprising ways?			
Is your work a novel or valuable response to the task of the project?			
Does your work make you ask new questions to build upon an idea?			
Did this project enable you to discover or learn something by yourself (maybe not something directly instructed)?			

APPENDIX I

POSTTEST CRITIQUE AND CREATIVITY ASSESSMENT

Ceramics Critique 2

Part of the learning experience in creating art is being able to analyze the work. By taking time to study a piece of art and express your thoughts about the strengths and weaknesses of the work, you will develop a better understanding of what appeals to you and what does not. The things you write for this critique should **demonstrate thought** and need to be **written in complete sentences.**

Title of your work:

_____

Dimensions:

Height:_____"
Width:_____"
Length:_____"

Glaze Used:

_____

Draw an accurate picture of your work in the box.--→

Project Success:

- What is specifically successful about your project?

- What part are you the most proud?

Creativity Criteria, as defined by students:

Criteria 1: Describe how your project is changed or improved upon from the first tar-paper clay slab project:

0	1	2	3	4	5
Not At All	A Little	Somewhat (<50%)	Somewhat (50%)	Mostly	Yes, 100%

Criteria 2: Describe how your project is different from the others in class:

0	1	2	3	4	5
Not At All	A Little	Somewhat (<50%)	Somewhat (50%)	Mostly	Yes, 100%

Criteria 3: Describe how your project can be used for something, even if it is only used for a work of art:

0	1	2	3	4	5
Not At All	A Little	Somewhat (<50%)	Somewhat (50%)	Mostly	Yes, 100%

Creativity Criteria	Describe how you did or did not do this criteria in your project:	Rate Your Work 0 - 5	Teacher Rating 0 - 5
Does your work synthesize ideas in original and surprising ways?			
Is your work a novel or valuable response to the task of the project?			
Does your work make you ask new questions to build upon an idea?			
Did you discover or learn something by yourself?			

APPENDIX J

STUDENT WORK IMAGES

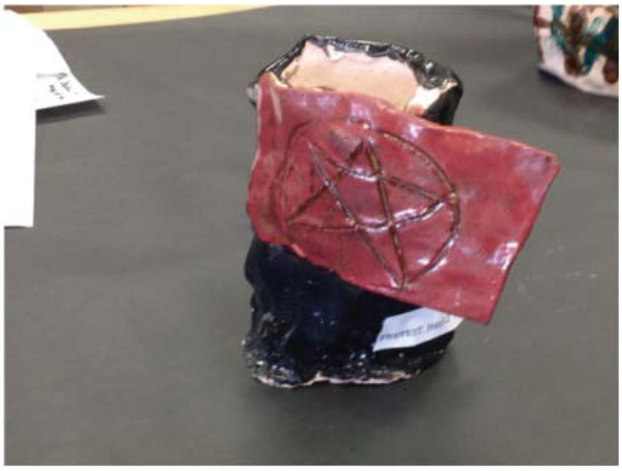
PRETEST AL007, EXPERIMENTAL GROUP

PRETEST JH032, CONTROL GROUP

PRETEST SK042, CONTROL GROUP

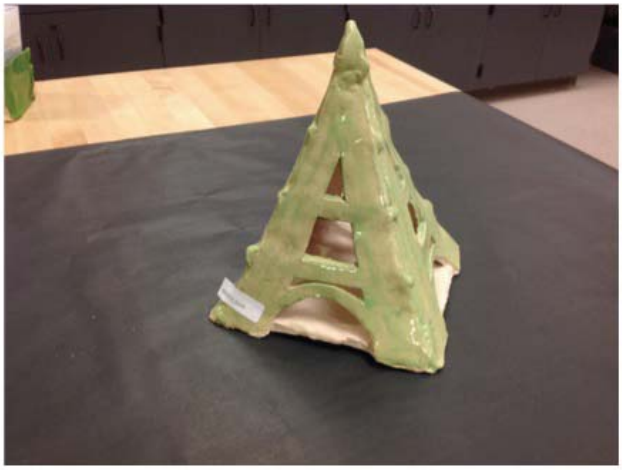
PRETEST SK046, CONTROL GROUP

PRETEST DG026, CONTROL GROUP



PRETEST JH052, CONTROL GROUP

PRETEST JH056, CONTROL GROUP



PRETEST JL020, CONTROL GROUP

PRETEST MJ074, CONTROL GROUP

PRETEST NH034, CONTROL GROUP

PRETEST SM036, CONTROL GROUP

PRETEST HB033, EXPERIMENTAL GROUP

PRETEST TC058, CONTROL GROUP

PRETEST AL007, EXPERIMENTAL GROUP

PRETEST CE015, EXPERIMENTAL GROUP

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