DESIGN-BASED LEARNING: A METHODOLOGY FOR TEACHING
AND ASSESSING CREATIVITY

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SIGNATURE PAGE

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DEDICATION

I dedicate this work to all of my students, who, at a time when I felt that I lost my CORE, helped to renew the Confidence, Ownership, Resiliency, and Engagement I needed as a teacher to work toward my goal of becoming a great educator.

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ABSTRACT

This study aimed to determine how Design-Based Learning (DBL) methodology contributes to students’ growth in skill areas related to creativity and how it contributes to teachers’ growth in use of instructional and creative strategies to promote creativity. In addition, this study aimed to explore teachers’ strategies for measuring students’ creative growth utilizing authentic assessments. A multicase study was conducted across three cases. Focus groups and one-on-one interviews were conducted with teacher participants. Additionally, the physical classroom environment of each teacher was observed in order to document evidence of creative teaching strategies and student outcomes. It was found that creative potential was heightened in students when teachers engaged them in various skills-based activities associated with the DBL methodology, such as building models, orally presenting solutions to problems, and collaborating to make decisions about their learning experience. The increase in creative potential of students that was described by participating teachers was observed in concert with an increase in student confidence, ownership, resiliency, and engagement.

Key words: Design-Based Learning methodology, authentic assessment, confidence, ownership, resiliency, engagement
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CHAPTER 1: INTRODUCTION

Current educational reform in the United States is guided by policies that call for states to develop and/or adopt standards for instruction that incorporate skills deemed necessary for success in college and careers. These include the following learning and innovation skills: collaboration, critical thinking, communication, and creativity and innovation. These skills are outlined in the P21 Framework for 21st Century Learning, which is a companion document to the Common Core State Standards (CCSS) that have been adopted and are being implemented in at least 42 states across the nation (Common Core State Standards Initiative, 2010). The framework document further breaks down the creativity and innovation strand into three distinct areas, describing student outcomes that would satisfy each.

Background to the Problem

In the United States, current federal policy mandates that each state adopt a set of content standards to prepare students for college and careers. This standards-based reform is not a new concept as it began on a state-by-state basis in the early 1990’s and continued through the next two decades as reflected in the Goals 2000, the Improving America’s Schools Act in 1994, and the No Child Left Behind (NCLB) Act of 2001 (Mehta, 2013). The variation in what students were required to learn in each state led to criticism of state standards (Watt, 2011), as some were viewed as not being appropriately rigorous in adequately preparing students for college or the workforce (Sloan, 2010). During the current era of reform, attention has been focused on development of national standards so it could be ensured that students across states were learning the same content and skills (Porter, McMaken, Hwang, & Yang, 2011). The Common Core State
Standards (CCSS) is a set of national standards developed through a partnership between the National Governors Association (NGA) Center for Best Practices and the Council of Chief State School Officers (CCSSO). These standards have been tied to Title 1 school funding as an incentive for states to implement. They were developed with the intention for consistency in education nationwide (Conley, 2014).

In California, the CCSS were adopted as the guide for curriculum development and instruction along with the P21 Framework for 21\textsuperscript{st} Century Learning, a set of standards aimed at developing students’ skill sets within the context of each of their content-related learning experiences. With the intent of building student capacity for demonstrating skills deemed necessary for success in college and careers (Partnership for 21\textsuperscript{st} Century Learning, 2015), the P21 framework identifies key areas of skills development beyond mastery of content knowledge. These include:

- Learning and innovation skills
- Information, technology, and media skills
- Life and career skills.

The P21 organization describes the learning and innovation skills as encompassed in four main capabilities, referred to as the 4 C’s: collaboration, communication, critical thinking, and creativity and innovation (Partnership for 21\textsuperscript{st} Century Learning, 2015). The creativity and innovation skills are further defined as having the components outlined in the table in Appendix A.

There is much debate about what creativity looks like in the classroom and how teachers teach and assess such skills. Research demonstrates the on-going challenge of assessing creativity. In their empirical review of creativity self-report scales, Silvia,
Wigert, Reiter-Palmon, and Kaufman (2012) assert that, “assessment has been a vexing problem for creativity researchers over the decades, in part because creativity research aspires to observe and measure things that are atypical, novel, innovative, and unusual, be they products, ideas, or people” (p. 19). Assessing the unknown provides challenges for educators who are familiar with providing feedback on products expected to be similar.

There is considerable research in the field of education about creative thinking, problem solving, and education reform. However, there is limited research that explores the overlap of those three topics and what systems or methods for implementing creative curriculum design might serve to facilitate student creativity. Such research would be valuable to educators faced with meeting the demands of CCSS. This study examined one instructional methodology, known as the Design-Based Learning (DBL) methodology, and how its approach to teaching and assessment can be an effective strategy to develop students’ skills related to the creativity and innovation standards as outlined in the P21 Framework.

DBL is a teaching methodology that provides tools for teaching students course-specific content as they build three-dimensional models to represent solutions to problems based on a set of criteria (Nelson, 1984). In his book, Killing Ideas Softly? The Promise and Perils of Creativity in the Classroom, Beghetto (2013) argues that constraints are necessary for creativity to be expressed. He states, “Creativity also requires appropriateness and fit…creativity can, and often must, thrive within constraints” (p.7). It is in this manner that DBL methodology lends itself to the creative process. The DBL classroom teacher establishes criteria in order to guide students during their model building.
Purpose of the Study

The CCSS, in conjunction with the P21 Framework for 21st Century Learning, explicitly asks teachers to shape students’ creativity in thinking strategies, problem solving, and communicating knowledge with peers and a wider community. The purpose of this study was to determine how DBL methodology contributes to students’ growth in skill areas related to creativity and how it contributes to teachers’ growth in use of instructional and creative strategies to promote creativity.

In order to contribute to the understanding of teaching and assessing creativity in K-12 classrooms utilizing the DBL methodology, this research examined various DBL teachers’ experience with implementing DBL methodology, their use of the physical space in their classrooms, and their experiences in the Masters of Arts program with a focus on DBL methodology at Cal Poly, Pomona.

Research Questions

In order to structure the inquiry of the effectiveness of the DBL methodology for teaching and assessing creativity skills, three research questions were developed:

1. How does DBL methodology contribute to students' growth in skill areas related to creativity?

2. How does DBL methodology contribute to teachers' growth in use of instructional strategies to enhance creativity?

3. How does DBL methodology contribute to teachers' growth in assessment strategies to promote creativity?

These questions guided the gathering of data in order to determine the findings that would inform the results. These questions were developed from examination of the
discrete creativity and innovation skills outlined in the P21 Framework for 21st Century Learning as outlined in Appendix A.

Significance of the Study

In an era of educational reform, teachers need to explore instructional methodologies that lend themselves to curriculum development that meet the standards and engage students in demonstrating learning creatively. This research will provide insight into one possible instructional methodology that has been described to not only allow students to be creative in their learning experience, but also give teachers the tools to be creative in their development and delivery of curriculum. Results from this study may guide current and future teachers to explore DBL methodology through professional development, workshops, or higher education degree programs. In addition, this study could offer educators guidance in encouraging creativity from their students.

Definitions of Terms

The following terms are defined in order to illuminate concepts and ideas related to Design-Based Learning as they are presented in this study.

**Backwards Thinking™.** Backwards Thinking™ is a teaching method developed by Professor Doreen Nelson where students first build a 3-D object following a list of criteria. Course content is embedded into the criteria list that will later be learned by students. The object then serves as an analogy for the content the teacher wishes to teach. After engaging in guided lessons and revising their designs, students demonstrate their learning three-dimensionally in addition to engaging in writing and other related classroom projects and activities as they arrive at the broad content-related concepts or theories that explain their work. This is similar to inductive reasoning processes where
specific observations lead to understanding of general concepts. This is different from the traditional method of teaching where typically, concepts in a particular content area are introduced first before students engage in various learning activities that support that concept. The traditional method of instruction is more deductive in its approach; as students learn the general content-related idea or concept, then experience more specific learning activities that support that concept.

**Bloom’s Taxonomy.** Developed by Benjamin Bloom (1913-1999), an American educational psychologist, the traditional model of Bloom’s Taxonomy is a classification of cognitive skills ranging from lower recall skills to increasingly higher levels of critical thinking skills. Educational goals for cognitive skills historically fell into the following six levels, from lowest to highest: Knowledge, Comprehension, Application, Analysis, Synthesis, and Evaluation (Krathwhol, 2002).

Since its inception, Bloom’s Taxonomy was updated to explicitly include creativity as the pinnacle of cognitive skills. In his article, “A Revision of Bloom’s Taxonomy: An Overview,” Krathwohl (2002) explains, “application, analysis, and evaluation were retained, but in their verb forms as apply, analyze, and evaluate. Synthesis changed places with evaluation and was renamed create” (p. 214). In this revised version of Bloom’s Taxonomy, the ability to create novel products and methods of solving problems represents the highest level of cognitive skills.

**Criteria List.** A criteria list defines parameters used to guide students during construction of three-dimensional products during their design challenges. The criteria list embeds ideas and concepts drawn from course curriculum.
**Design-Based Learning (DBL).** Design-Based Learning, formerly City Building Education™ was developed by Professor Doreen Nelson and was specifically targeted at K-12 education. In this instructional methodology, students approach a design problem by designing and building a three-dimensional product fulfilling a list of criteria. This product then serves as an analogy for learning course content through guided lessons. A DBL curriculum consists of a series of connected design challenges that serve as the context for student learning.

**Never-Before-Seen (NBS).** This is a phrase presented to students as their most important criterion for design challenges. It is used in order to cultivate student creativity and original thought so that the three-dimensional products of students demonstrate innovation rather than becoming recreations of already existing designs.

**Assumptions**

1. Participants currently implement DBL methodology in their curriculum design and delivery in their classrooms.

2. Participants were K-12 teachers in public schools.

3. Participating teachers worked in districts that implement CCSS.

4. Participants had experience with teaching students from multiple backgrounds.

5. Participants had experience with teaching students who entered their classrooms possessing varying levels of knowledge and skills.

6. During interviews, participant responses were truthful.

7. Participant responses were based on current classroom practice.
Summary

This chapter introduced the purpose of the study in order to situate the chapters that follow around a central goal. In order to explore the impact that Design-Based Learning methodology may have on both teacher and student creativity, this study was organized in a manner that presents a critical review of relevant literature, explains the research methodology, interprets patterns in collected data to answer the research questions, and provides conclusions and recommendations for educators.

Chapter 2 of this study presents a review of pertinent literature that pertains to the research topic and questions. Chapter 3 describes the rationale of the methodology explaining the selection of various data collection techniques in the research methodology. Chapter 4 presents the results of the data and an interpretation of patterns identified. Chapter 5 provides conclusions and a discussion drawn from the collected data and offers recommendations to educators looking to gain understanding of the DBL methodology and how it can be used to teach and assess creativity. Finally, recommendations are provided to identify relevant issues that merit further research.
CHAPTER 2: REVIEW OF LITERATURE

This literature review stemmed from the desire to discover to what degree the Design-Based Learning (DBL) instructional methodology is able to empower teachers to shift their classroom practices away from teacher-centered modes of instruction to create a student-centered learning environment aligned with requirements of current educational reform. Historically, educators have often debated the usefulness of student-centered, constructivist methods of instruction as opposed to those perceived to be more traditional and teacher-centered, basing their arguments on ideas and recommendations from theorists in the fields of education, psychology, and child development. Although such debate still persists in American education, the 21st century presents a unique context for the argument as classroom teachers are asked to employ a more student-centered approach to instruction focused on big ideas and transferrable skills necessary for students to be successful in college and careers.

The DBL methodology was formed on the principles of constructivism and the fundamental idea that a student-centered classroom leads to the cultivation of higher-level thinking skills, mastery of content, and engagement in collaborative decision-making in a democratic classroom setting. Rather than relying on lecture and other passive activities, teachers of the DBL methodology hold the value that they are facilitators of student learning and discovery as they build collaborative student-centered classroom environments (Nhem, 2015). There is a gap in the research, however, about how teachers employing this methodology make sustainable changes in their teaching strategies in order to intentionally encourage student growth in various skill areas, specifically creativity and innovation.
In order to address this issue, the literature review is organized to describe the overlap among constructivist teaching models, the tools and tenets of the Design-Based Learning instructional methodology, and the current state of education policy, particularly in relationship to Common Core State Standards (CCSS), and the implications that serve to inform curriculum and instruction in American education. The review of literature first presents the current state of instructional policy guided by the CCSS in order to present a rationale for exploring promising models of instruction that lend themselves to meeting the demands of educational reform initiatives. Research, theories, and instructional models of both contemporary and historical advocates for such classroom strategies, such as John Dewey and Jean Piaget, will be discussed in order to provide context and to demonstrate the persisting recognition of the importance of such classroom models. Finally, literature focused specifically on the Design-Based Learning (DBL) instructional methodology will be explored in order to present an existing mode of classroom instruction that could potentially play a role in helping teachers to be successful in making the transition to meet the requirements of the CCSS, develop student creativity skills, and make learning meaningful for students.

**Policy Informing Instruction**

The Common Core State Standards (CCSS) were released in 2010 with the intention of shifting instruction in English language arts and mathematics away from varying content guidelines across individual states to a shared set of standards that ensure consistency in the quality of instruction in all states (Porter, McMaken, Jun Hwang, & Yang, 2011). Led jointly by the National Governors Association (NGA) Center for Best Practices and the Council of Chief State School Officers (CCSSO), the Common Core
State Standards Initiative developed these standards as a state-led effort to establish consensus on expectations for student knowledge and skills that should be developed in Grades K–12. By the beginning of the 2014-2015 school year, 44 of the 50 states adopted the standards to guide instruction in their schools (Common Core State Standards Initiative, 2010).

**Historical educational reform efforts informing CCSS.** Historically, public education in America has been met with various initiatives and reform efforts over the years (Porter et al., 2011). Although differences in time periods, stakeholders, and cultural beliefs about education as a public good evolved, Wallender (2014) asserts that there is a pattern of similar justifications used for implementing any educational initiative or reform measure. These include: “creating common educational standards, preparing students for college, stressing quality education for all students, and increasing rigor in schools” (p. 8).

In *A Nation at Risk*, Gardner (1983) claimed that reduced American education led to an ineffective system that produced mostly functionally illiterate children. The report argued that the majority of high school students were in need of remediation in math, were unable to solve multi-step problems, and could not write a persuasive essay. The follow-up report to *A Nation at Risk*, *Our Schools and Our Future: Are We Still at Risk?* (Peterson, 2014), claimed that standards-based reform efforts related to NCLB were not working effectively, there was a lack of accountability for both teachers and schools as a whole, and that there was a lack of accurate information about student, school, and teacher performance. Since their inception, whether warranted or not, these reports constantly resurfaced as reform efforts in U.S. education were developed, including the
Improving America’s Schools Act, the Elementary and Secondary Education Act (ESEA), No Child Left Behind (NCLB), and, most recently, the Blueprint For Reform Act (Jorgensen & Hoffman, 2003). Each of these educational reform efforts stem from the federal government’s aim to improve student achievement and reverse the perceived lagging levels of student achievement reported in A Nation at Risk (Rhodes, 2012).

The CCSS is not the first attempt at standards-based education reform. The No Child Left Behind (NCLB) Act that was implemented during the President George W. Bush administration required states to test, disaggregate, and report student performance data while selecting standards and tests to use (Bidwell, 2014). However, that reform effort saw great variability in what different states taught and assessed (Gutierrez, 2011). To address the concern over lack of consistency in curriculum across states and to ensure that all students in the nation receive a quality education, the CCSS were developed.

**CCSS development and adoption.** The CCSS on which to base instruction were developed in response to the perceived worsening quality of American education (Gamson, Lu, & Eckert, 2013) and the changing global economy causing an increased competitiveness in the workplace both at home and abroad (Common Core State Standards Initiative, 2010). The CCSS:

- build upon previous experience with standards, both in the US and abroad, to create a focused, challenging, appropriate set of learning expectations that educators can interpret and implement locally through the curriculum, programs, and teaching methods they decide are best suited to their students. (Conley, 2014)

In order to assure that American children receive a world-class public K-12 education (National Governors Association, 2008) that serves to prepare them for success in both
college and career, the CCSS development took into account the benefits and drawbacks of previous standards-based initiatives in the United States (Conley, 2014). It was this critical reform effort facilitated by the NGA and CCSSO that resulted in a majority of states as well as territories adopting the standards in part, whole, or with state-designed modifications (Watt, 2011).

The CCSS initiative is a state-led effort, rather than a federal one, to create rigorous, clear, and consistent academic standards like those recommended in the *Blueprint for Reform* (Gutierrez, 2011). Although it is not a federal requirement that states adopt the CCSS (National Governors Association, 2008), the *Blueprint for Reform* mandates that states develop and/or adopt standards to ensure that all students, regardless of race, ethnicity, English proficiency, or disability status, are prepared for college and careers. The CCSS offer states a way of making sure they adhere to this mandate in terms of the content and skills they are teaching their students (National Governors Association, 2008).

The *Blueprint for Reform* (U.S. Department of Education, 2010) was a reauthorization of Elementary and Secondary Education Act (ESEA). It focuses on several key priorities:

- Preparing students for college and career
- Ensuring great teachers and leaders in every school
- Meeting the needs of English Language learners
- Providing a complete education
- Supporting successful, safe, and healthy learning environments
- Fostering innovation and excellence
Most notable in the *Blueprint for Reform* is the requirement for states to work together to develop and adopt common standards in English language arts and mathematics to ensure student preparation for college and career readiness by high school graduation (U.S. Department of Education, 2010).

The CCSS focus on English language arts and mathematics. In high school, however, the English language arts standards for reading, writing, speaking, listening, and language are also applied to literacy standards in history and social studies, science, and technical subjects. The expectation is that students will develop literacy skills specific to these subject areas in addition to what they learn in their language arts classes. (Conley, 2011, p. 16)

The CCSSO and the NGA developed these standards in collaboration with a large number of stakeholders. The goal of the CCSS initiative was to develop standards that could guide states’ efforts to prepare students for college and careers after high school (Conley, 2014). However, there is a gap in the literature in regard to educators’ knowledge, perceptions, and preparedness in implementation of CCSS. Given the level of impact that educators have on reform implementation, their knowledge and perceptions of these programs are critical to the successful implementation of reform efforts (Nadelson, Pluska, Moorcroft, Jeffrey, & Woodard, 2014).

Although there are a number of proponents of the CCSS, standards have also been met with some criticism. Some critics argue that the CCSS defines literacy in the classroom to include certain types of text, not giving enough attention to online literacy and its distinct purposes, processes, and forms in order to include the most typical sources of reading with which students engage outside of school (Drew, 2013). In her article,
“Open Up the Ceiling on the Common Core State Standards: Preparing Students For 21st-Century Literacy-Now,” Drew (2013) states, “the majority of reading in which students engage takes place online; therefore, students must be prepared with skills, strategies, and dispositions to succeed in a globally networked, multimodal, digital age of information and communication” (p. 322). In addition, the persisting standardization of assessment tools has been met with pushback from parents, educators, and politicians alike in that it mirrors more of the same issues that arose with the NCLB reform (Bomer & Maloch, 2011). Conley (2011) states:

Implemented correctly, the common standards and assessments can vault education over the barrier of low-level test preparation and toward the higher goal of world-class learning outcomes for all students.

Implemented poorly, however, the standards and assessments could result in accountability on steroids, stifling meaningful school improvement nationwide. (p. 16)

**Implementation of the CCSS education reform at the local level.** In their journal article, “Educators' Perceptions and Knowledge of the Common Core State Standards,” Nadelson et al. (2014) state, “as with any K-12 educational reform effort, the effectiveness of the CCSS is largely dependent on the knowledge and perceptions of the educators who will implement the standards” (p. 48). Since the CCSS were developed by a consortium of state leaders, consisting of governors and chief state school officers (Manna, 2010) rather than being in response to a directive of the federal government (Conley, 2014), interpretation of the standards and implementation efforts are based on ownership of the process by the states opting to adopt the CCSS as well as other local
stakeholders (Watt, 2011).

School districts in states where the CCSS were adopted are charged with the responsibility of unpacking the standards and creating curriculum that meets the requirements of these standards in acquisition of both content and career readiness skills within the context of their particular schools (Porter et al., 2011). Unlike the previous state standards developed in response to the No Child Left Behind (NCLB) Act of 2001, the curricular standards of the CCSS initiative informing instruction reduce variability between states implementing CCSS (U.S. Department of Education, 2010). The strategies for meeting the standards are left to teachers, administrators, and perhaps outside organizations and consultants participating in the work with school districts. Bomer and Maloch (2011) assert, “the standards assume that diverse regional and ideological perspectives can be reconciled under a universalized, rationalized curriculum framework. They hope to hold under a single umbrella perspectives that may in some ways compete” (p. 39). In other words, the CCSS permits schools to determine the examples, projects, prompts, or other classroom activities appropriate to their schools’ contexts with the assumption that students can acquire the necessary content knowledge and skills.

Although the aim of these standards is to prepare all American students for college and careers after high school and development of these standards began with high school-level English language arts and mathematics courses in mind (Conley, 2011), these standards apply to all grades, K-12. Therefore, all educators within an educational organization have been charged with evaluating their classroom practice and making adjustments in order to align their curriculum with CCSS.
Since implementation of the CCSS has been defined as the work of local school districts, it is up to these educational organizations to define the strategies teachers must use in order to effectively deliver curriculum to students (Conley, 2011). Conley (2014) explains, “while standards provide a framework, they do not require a certain curriculum or specific teaching methods” (p. 7).

**Traditional vs. Progressive Educational Schools of Thought**

Traditional teaching methods are perceived to rely heavily on lecture and teacher-led learning activities (Estes, 2004). Even with the CCSS highlighting higher-level skill acquisition and asking for teachers to deliver curriculum in a manner that asks students to be active learners (Conley, 2014), the practice still persists of test preparation, or gearing instruction toward “teaching to the test,” and settling for low level thinking activities, resulting in disengagement of students in some schools.

In regards to a progressive learning environment, “it is active, not passive. The learner is a problem solver and thinker who makes meaning through his or her individual experience in the physical and cultural context” (Cohen, 1999, p. 3). Jonassen and Land (2012) argue that learning is not a simple process of knowledge transmission. Instead, it is a process of the learners making meaning of their experiences through personal reflection, as well as through social interactions with people that influence their knowledge and beliefs about their immediate environment and the world. According to Perkins (2009), conventional educational efforts focus on the known and teach students isolated topics rather than focusing on the “whole game.” However, it is the progressive theories of education that stress the need for allowing students to learn through investigation and discovery. It is these views that define the values that are central to
progressive educational models such as constructivism.

**Constructivism.** Constructivism has its roots in philosophy as a theory of knowledge acquisition as well as in experiences of educators and more recently in the work of researchers looking for the overlap between theory and practice (Fensham & Gunstone, 1994). The basic tenets of a constructivist theory of learning can be summarized as follows:

Individuals create or construct their own new understandings or knowledge through the interaction of what they already believe and the ideas, events, and activities with which they come into contact. The teacher is a guide, facilitator, and co-explorer who encourages learners to question, challenge and formulate their own ideas, opinions and conclusions. (Ultanir, 2012, p. 195)

John Dewey was one of the original contributors to constructivist theories. In his book, *Experience and Education*, Dewey (1938) explained that the “educator can direct the experience of the young without engaging in imposition” (p. 40). In other words, educators teaching within the constructivist realm serve as guides for the learning of students, leading them to construct their own knowledge through strategic questioning and design of classroom activities and learning experiences (Bruner, 1976). This strategy leads students to deeper learning of material that they can transfer to various problems both in and out of the classroom. Swiss cognitive psychologist, Jean Piaget, formulated stages of cognitive development to define constructivist theory. His theories about students learning through discovery are reflected in *Carmichael’s Manual of Child Psychology*. Piaget (1970) stated, “each time one prematurely teaches a child something
he could have discovered himself, that child is kept from inventing it and consequently from understanding it completely” (p. 715).

It has been shown that a constructivist learning environment lends itself to improve students’ problem solving abilities. Kwan and Wong (2015) found that constructivist learning environments had an overall positive effect on students’ abilities to apply critical thinking skills. However, the researchers did point out that simply providing seemingly higher level thinking activities and experiences to students did not improve their ability to effectively and appropriately apply thinking strategies. This is often a criticism of constructivist learning environments. The perception that a constructivist teacher simply allows students to solely drive the curriculum where they decide what they learn, how they learn it, and how they show they learned it tends to lead critics to describe this type of learning environment as having little guidance for student learning (Kirschner, Sweller, & Clark, 2006).

However, it is quite the contrary. Constructivist education depends upon careful guidance, facilitation, and modeling of skills by the teacher (Ultanir, 2012). Kirschner et al. (2006) found that “most teachers who attempt to implement classroom-based constructivist instruction end up providing students with considerable guidance” (p. 79). As described in the research, positive correlations between the learning environment and higher cognitive thinking skills were only observed when the teacher taught and modeled how and when to appropriately utilized those skills (Kwan & Wong, 2015). This is consistent with constructivist theory and its tenets of not only providing students with opportunities to take ownership of their learning, but for the teacher to guide students in their acquisition of knowledge and skills (Ultanir, 2012).
**Student-centered classroom environment.** A student-centered, or learner-centered, classroom allows students to go beyond what would traditionally be expected in that they are encouraged to pose their own questions, generate novel ideas for solving those problems, and are able to make and learn from mistakes (Davis, Hawley, McMullan, & Spilka, 1997). In K-12 education, many classrooms are not student-centered, but rather they focus heavily on content transmission from instructor to student (Cullen, Harris, & Hill, 2012). Cullen et al. (2012) also argue that it is not enough to redesign curriculum in order to have a student-centered, or what they call learner-centered, method of instruction, but the learning environment itself needs to be redesigned in order to foster a student-centered learning experience (2012). According to Dewey (1938), educators “should know how to utilize the surroundings, physical and social, that exist so as to extract from them all that they have to contribute to building up experiences that are worthwhile” (p. 40).

The concept that the physical space of a classroom contributes to student learning is not a new idea. In his book, *Experience and Education*, Dewey discussed the need for educators to be able to purposely utilize the physical surroundings in their classrooms to contribute to student learning experiences (1938). The classroom environment is not only able to aid in student motivation and engagement in their current educational setting but it can be a motivating factor in students’ becoming lifelong learners (Lord, Prince, Stefanou, Stolk, & Chen, 2012). Developing a classroom environment that is learner-centered, however, poses a challenge for many educators.

Although there is no specific guide as to how a classroom environment should look in order to promote the greatest level of student learning and critical thinking
utilizing a constructivist approach, numerous thinkers in the field of education share some common beliefs about the physical and social components of a learning space that fosters thinking and learning. In her research on physical environments of primary level classrooms, Jones (2012) observed, “in many settings teachers are given some autonomy but little guidance in the establishment of the physical environment of the classroom” (p. ii). Many researchers and educational theorists have historically referred to a constructivist view of education when discussing the progressive physical and social classroom environment. Maria Montessori, whose learning-by-play constructivist model of education influenced the development of numerous Montessori schools, argued, “the environment must be rich in motives which lend interest to activity and invite the child to conduct his own experiences” (Montessori, 1967, p. 92).

Physical attributes of a constructivist classroom often include manipulatives allowing students to be active (Jonassen, 1999). Schools designed according to Montessori’s theories of education often mirrored a student’s home. The physical space is divided into purposeful spaces where students interact with the environment as part of their learning activities (Montessori, 1967). However, students are not isolated in their interactions and experiences in the classroom environment. Montessori’s theory of education aligns with that of other constructivist theorists in that it is the social interactions within the classroom that promote student learning (Ultanir, 2012).

The environment of the classroom should be designed to not only provide students with hands-on experiences, utilizing various resources within the physical space as learning tools, but it should also be designed to create opportunities for social exchange and cooperative learning (Ultanir, 2012). The teacher coaches students as they
encounter difficulties, but does not solely instruct the students in the content area. Instead, the teacher encourages and guides students to actively participate in their own learning, interacting with peers in order to discover meaning in the content rather than relying solely on the teacher (Jones, 2007). Through role-playing and problem solving, a student-centered classroom teaches students to take responsibility for their own learning and develop thinking skills necessary for creative real-world problem solving.

**Fostering creativity in a student-centered classroom.** A constructivist teaching model asks students to make individual meaning of content through teacher-facilitated experiences, often including manipulatives and other learning tools, through interactions with peers, and through internal reflection of learning (Ultanir, 2012). Taking ownership of one’s own learning requires a level of creativity in question asking and inquiry, design of products, and problem solving techniques. It is recognized that all students are capable of this type of high level thinking since all students have the potential to be creative and rather than being an inherent quality, creativity can be developed (Lin, 2011).

Teaching and assessing creative problem solving skills in the classroom is also one of the attributes associated with curriculum aligned to CCSS. However, this remains one of the more controversial topics in the recent educational reform effort due to the perceived subjectivity of assessing creativeness (Brookhart, 2013). Research exploring creativity as it relates specifically to Common Core implementation is limited due to current lack of assessment data from CCSS implementation efforts.

Wyse and Ferrari (2015) conducted content analysis and surveys in order to analyze creativity in the curriculum of European nations. They present a rationale for including creativity in education by stating, “as a result of growing recognition that
creativity is an important element of economic prosperity, governments around the world have turned their attention to how children and young people might acquire the necessary attributes of creativity as part of their education” (p. 40). American educational reform and its embrace of the CCSS define creativity as one of the essential skills students need not only to be ready for college, but also be able to compete in the global economy through their ability to contribute innovative and novel solutions to unforeseen problems in the world (National Governors Association, 2008). In their research, Davies et al. (2014) found evidence to support the importance of several factors in developing creative skills in children and young people:

- Flexible use of space and time
- Availability of appropriate materials
- Working outside of the classroom/school
- ‘Playful’ or ‘games-base’ approaches with a degree of learner autonomy
- Respectful relationships between teachers and learners
- Opportunities for peer collaboration
- Partnerships with outside agencies
- Awareness of learners’ needs
- Non-prescriptive planning.

Davies et al. (2014) argued that the simple presence of such factors were not enough to elicit creative thinking from students, but the modeling of such creative attitudes was necessary for students to demonstrate the desired skills.

Creative expression as a means of demonstrating learning requires students to employ higher level thinking skills (Lin, 2011). Rather than providing substantial direct
instruction and requiring rote memorization, teachers must provide a variety of opportunities for students to express creativity in order for them to build the skills necessary for them to become independent in demonstrating their ability to be innovative thinkers (Simonton, 2012). In an online series of modules hosted by the education department at the University of Oregon, Cohen (1999) argues, “in the classroom there is reasonable evidence that, in order to stimulate creative responses from pupils, activities need an element of novelty.”

Teaching creativity in the classroom is not just a matter of cognitive development. Teachers must also take into account student growth in the affective domain (Grohman and Szmidt, 2013). Certain behaviors or attitudes that are often associated with creativity need to be nurtured in young people (Claxton, Edwards, & Scale-Constantinou, 2006). In their article, *Teaching Creatively and Teaching for Creativity: Distinctions and Relationships*, Jeffrey and Craft (2004) distinguished between creative teaching methods and what it takes to foster creative thought and attitudes in students. These are not mutually exclusive concepts as they dependent on each other in order to encourage creativity (2004). Grohman and Szmidt (2013) summarized the concept of teaching for creativity. They (2013) stated:

> the concept of teaching for creativity…focuses on encouraging young people to believe in their creative identity and creative abilities, and on fostering creativity by curiosity and learner inclusive pedagogy, where the learner is encouraged to engage in identifying and exploring knowledge.

(p. 16)
This distinction reveals that students need to possess a sense of confidence in order to demonstrate creative thinking. Additionally, teachers need to include the learners in developing their knowledge through a shared ownership of the learning process. Although students should have a voice in their learning experience and engage in decision-making practices in the classroom, it is not the argument that students should be given full autonomy and control (Grohman and Szmidt, 2013; Jeffrey & Craft, 2004). Davies et al. (2013) clarify this point:

There is strong evidence from across the curriculum and age-range that where children and young people are given some control over their learning and supported to take risks with the right balance between structure and freedom, their creativity is enhanced. (p. 85)

It is within boundaries developed by the teacher in which they share ownership of learning with their students, thus encouraging students to be creative in their approaches to solving problems.

Creativity is not only evident through student confidence in their creative ability and their ownership of their learning. Claxton et al. (2006) discussed what they called “creative mentalities,” which revealed that one of the key factors that plays a role in student creativity is resiliency. Claxton et al. (2006) explain that resiliency is the “ability to tolerate confusion and frustration, to relish a challenge, and not to give up prematurely” (p. 58) and that resiliency “has to be a core attribute of creative people” (p. 58).

Creative attitudes and behaviors need the attention of the classroom teacher if they want to develop student creativity. They also need to employ
creative teaching techniques to support that goal (Jeffrey & Craft, 2004). Much of
the research on creativity in the classroom alludes to the use of modeling and
hands-on activities as being strategies that can aid in the development of creative
problem solving skills in students (Davis, 1998; Davis, Hawley, McMullan, &
explore strategies related to this idea, the next section will discuss utilizing design
principles as a method of generating creative thinking.

Assessing creativity through authentic assessment. Assessment in education
has long been scrutinized. Over twenty years ago, Wiggins (1993) criticized traditional
testing and assessment measures. He (1993) argued, “students are tested not on the way
they use, extend or criticize ‘knowledge’ but on their ability to generate a superficially
correct response on cue” (p. 2). Even more controversial, and often debated, is the idea
that student creativity can be measured by a teacher (Plucker, Beghetto, & Dow, 2004).
However, implementing authentic assessment techniques could aid teachers in their aim
to develop student creativity skills (Barbot, Besançon & Lubart, 2011).

In addition to developing assessments to measure student mastery of content,
Wiggins (1989a), one of the first proponents to apply the term authentic to assessment
techniques (Frey, Schmitt, & Allen, 2012), made a case for utilizing assessments for
developing student skills. In his article, “Teaching to the (Authentic) Test,” Wiggins
(1989a) stated, “Let the tests ask them [students] to write, speak, listen, create, do
original research, analyze, pose and solve problems” (p. 42). The skills mentioned here
relate to those that comprise the higher-level thinking skills described in Bloom’s revised
taxonomy (Krathwohl, 2002) in addition to the creativity standards outlined in the P21 Framework for 21st Century Learning.

Often, researchers and theorists define the term, *authentic assessment*, in differing manners. Different definitions also attribute various components as being indicative of whether or not an assessment tool could be considered authentic (Frey et al., 2012). In their article, “Defining Authentic Classroom Assessment,” Frey et al. (2012) summarize the lack of agreement in the field of education about the definition of authentic assessment:

A commonly advocated best practice for classroom assessment is to make the assessments authentic. Authentic is often used as meaning the mirroring of real-world tasks or expectations. There is no consensus, however, in the actual definition of the term or the characteristics of an authentic classroom assessment. (p. 1)

As Frey et al. (2012) point out, the agreement within the various definitions of authentic assessment lies in the characteristic that the assessment must be relevant and related to some real-world context. This differs than what are often defined as traditional assessment tools, where they are meant to measure a student’s knowledge of isolated, and often unrelated facts (Wiggins, 1990). Instead, authentic assessments focus on how the student can apply their knowledge when asked to complete some sort of performance task. Wiggins (1990) states, “authentic assessments attend to whether the student can craft polished, thorough and justifiable answers, performances or products” (p. 2).

Kearney (2013) further supports the use of authentic assessments for developing skills related to areas such as creativity. In his article, “Improving engagement: The use
of ‘authentic self-and peer-assessment for learning’ to enhance the student learning experience,” Kearney (2013) argues that educators should ensure that “assessments concentrate on the essential skills of the twenty-first century workforce, such as critical thinking and autonomous learning, and inspire innovation and creativity” (p. 876). In order to do so, he (2013) explains that authentic assessment techniques should be employed to encourage self-assessment, peer-assessment, and teacher evaluation of students’ growth in relation to desired learning outcomes. Although Kearney (2013) applied this thinking to higher education, it is applicable to K-12 education in terms of promoting students’ content acquisition in concert with developing their skills that are applicable to college and careers. In addition, Wiggins (1989a) argues that tests, or assessments, should be utilized formatively as a means of guiding student learning rather than solely at the end of sustained learning events. He (1989a) states:

Rather than seeing tests as after-the-fact devices for checking up on what students have learned, we should see them as instructional: the central vehicle for clarifying and setting intellectual standards. The recital, debate, play, or game (and the criteria by which they are judged) – the performance – is not a checkup, it is the heart of the matter. (p. 42)

In her book, Assessing 21st Century Skills: A Guide to Evaluating Mastery and Authentic Learning, Greenstein (2012) emphasizes, “Embedding 21st century skills, along with relevant assessments connected to real learning, into all parts of the curriculum, is one of the central tasks of teaching in our time" (p. xii). Assessments should not be used as infrequent summative measures of knowledge, but in order to meet the demands of 21st
century learning, educators must implement ongoing authentic measurement tools that assess such skills as critical thinking and creativity (Frey et al., 2012; Greenstein, 2012).

In order to explore how teachers implementing DBL methodology assess creativity in their classrooms, the next sections of this literature review will discuss utilizing design principles in teaching to promote creativity. This will lead into a discussion of a specific curriculum design and instructional delivery method based on design principles, the Design-Based Learning methodology.

**Utilizing design principles to generate creative thinking.** There is a strong connection between learning and design. In their book, *Constructionism in Practice: Designing, Thinking, and Learning in a Digital World*, Kafai and Resnick (1996) argue, “constructivism suggests that learners are particularly likely to make new ideas when they are actively engaged in making some type of external artifact; which they can reflect upon and share with others” (p. 1). Utilizing principles of design in education gives teachers a means of eliciting student curiosity and creativity. The design process lends itself to the ability of teachers to construct a curriculum that allows for a progression of learning and understanding related to an overarching problem or context. In addition, the design process can serve as a means of connecting learning and problem solving to real-world problems. Davis et al. (1997) contend, “Designers recognize that their cognitive skills and use of nonlinear processes are highly relevant to the complex nature of contemporary work and life” (p. 5).

Davis (1998) describes the benefits of educating young people utilizing design principles. She argues that thinking in the visual and spatial realms allows students to learn course content to a deeper level as well as acquire problem-solving skills that are
essential for success both inside and out of the school. In addition, she makes a case for implementing design as a K-12 teaching tool to meet society’s expectations that students become creative and competent problem solvers in order to utilize technology and information for the public good. In meeting these goals, Davis (1998) asserts that design strategies openly support multiple learning styles and intelligences, engaging students of varying backgrounds and skill levels in their learning (p. 7). In the next section, a particular instructional method, the Design-Based Learning (DBL) methodology will be discussed.

**Design-Based Learning Methodology**

The particular instructional model of Design-Based Learning (DBL) methodology explored in this literature review is The Doreen Nelson Method of Design-Based Learning formerly known as City Building Education™. As used in this literature review, the acronym DBL (Design-Based Learning) refers to this model. However, this method is not the only one that utilizes design principles in K-12 educational settings. Some of the other models that share pedagogical practices with DBL methodology are Design Challenge Based Learning (DCBL), Project-Based Learning (PBL), Inquiry Learning, and Challenge-Based Learning. Attributes that characterize these models as they relate to DBL are also explored.

**DBL as a constructivist instructional methodology.** Doreen Nelson, a professor at California State Polytechnic University, Pomona, developed Design-Based Learning (DBL) methodology, formerly known as City Building Education™, in order to teach students to use 3-D models to solve problems related to curriculum. The objects that students build become a means of not only unlocking creativity, but they allow
students to demonstrate a stronger ability to recall content related information and make connections between their learning and a multitude of scenarios in and out of the classroom (Nhem, 2015). Other instructional models that could be considered in the same family as DBL, such as Design Challenge Based Learning (DCBL), Project-Based Learning (PBL), Inquiry Learning, and Challenge-Based Learning typically follow frontwards design processes similar to that used by designers.

Davis et al. (1997) describe the steps of the standard design process used by designers as:

1. Identifying and defining problems
2. Gathering and analyzing information
3. Determining performance criteria for successful solutions
4. Generating alternative solutions and building prototypes
5. Evaluating and selecting appropriate solutions
6. Implementing choices
7. Evaluating outcomes. (p. 3)

This standard design process requires research to be implemented before the actual formation of a manipulative or prototype is created. In that research, designers look at how similar problems were solved in the past in order to incorporate others’ ideas into something new.

The Doreen Nelson Method of Design-Based Learning ™ (DBL) is similar to the aforementioned instructional strategies as they are all constructivist learning models that emphasize guided student engagement, however, it differs from the traditional design
According to Nelson (2006), the steps of the DBL process include the following:

1. Identify a theme or concept that underlies the curriculum
2. Identify a problem from the curriculum
½. Turn the problem into a “never-before-seen” design challenge
3. Set criteria for assessment, using the standards and content of the required curriculum
4. Let students “give it a try”
5. Teach traditional guided lessons
6. Students revise designs

The teacher is responsible for the first 3 ½ steps of this cycle. The students, acting as designers, first approach the problem in step four where they build a rough model to fulfill the criteria of the challenge posed by the teacher. They do this prior to guided lessons and research about the related topics. This is backwards from the traditional design process and the cycle of activities of other teaching methodologies based on design principles where they conduct all of their research prior to building an artifact (Davis et al., 1997). It is important to differentiate DBL methodology in this manner because when the manipulative is created and built first by students, they are required to engage in creating original solutions to problems before studying historic and contemporary views (Nelson, 1984).

DBL methodology shares some criticisms with the Design Challenge Based Learning (DCBL) model in that there could be a perceived lack of rigor, structure, and
specificity of assignment outcomes that teachers who are used to more traditional lecture-based, teacher-centered models of teaching may find challenging (Blevis, 2010). In addition, critics of design-based learning models argue that students will not sufficiently learn the content of various curricular domains and that such in-depth learning is time consuming and may sacrifice concepts that are historically part of a broadly defined curriculum (Laitsch, 2007). However, these perceptions are unsubstantiated. The DBL methodology is used intentionally for “enhancing flexible thinking skills, promoting self-directed learning and assessment, developing students’ interpersonal and communication skills, and cultivating responsible citizens” (Davis et al., 1997, p. 19) within the context of curricular requirements. Students learn to value each other’s opinions and ideas as they rely on each other to solve problems. The teacher acts as a facilitator, coaching students as they encounter difficulties, but does not solely instruct the students in the content area. Instead, the teacher encourages and guides students to actively participate in their own learning (Jones, 2007). Kwan and Wong (2015) conducted their research on this type of constructivist learning environment that incorporated students’ critical thinking skills. They found that the constructivist learning environment, where students were guided to acquire knowledge through discovery rather than through teacher-centered learning activities, positively influenced students’ critical thinking ability (Kwan and Wong, 2015).

**Establishing classroom governance to teach civic responsibility.** Establishing a system of self-governance in the classroom lends itself to decentralization. Students are able to manage their roles and responsibilities in the classroom, organize learning activities, regulate their time, and are able to follow a set of rules and regulations that
they helped to establish (Nelson, 1984). Furthermore, students’ learning in the classroom can be accounted for by their motivational and cognitive factors that are affected by the nature of the instructional methods and academic tasks (Kwan & Wong, 2015). When students are given a voice in their education, they tend to be more engaged in class tasks. This sort of classroom governance structure mirrors the philosophy of Dewey. Students participate in classroom activities that make them realize that school is a part of their lives rather than some sort of preparation for real life after school (Dewey, 1938).

DBL intentionally decentralizes the classroom, and in doing so, gives students more responsibility. Teachers act more in an advisory role that one of a lecturer, and students help organize class activities and are able to teach each other (Nelson, 1974). In fact, an essential component of DBL is the classroom government system, where students take specific roles in the classroom, interacting with peers to become decision makers and leaders (Nelson, 1984).

**Alignment of a methodology to CCSS.** Curriculum generally has three main components: objectives or content standards, activities and supporting materials, and assessments, whether formative or summative (Anderson, 2002). Aligning the components of a curriculum requires a cohesive delivery methodology that serves to tie student learning to defined learning outcomes (Lewis & Haug, 2005).

Lord et al. (2012) suggest that, regardless of delivery method, it is important for teachers to transfer ownership of the learning process to students in order to increase their confidence so they can operate independently as learners over time, or in other words, become life-long learners capable of solving a variety of problems. They argue that,
“student-centered pedagogies have been found to support the development of a range of
skills and attitudes associated with lifelong learning” (Lord et al., 2012, p. 606).

DBL is an instructional methodology that employs constructivist ideals. The
design of the methodology lends itself to meeting the demands of the CCSS while
recognizing best practices for increasing student engagement, improving higher-level
thinking skills, and teaching students creative thinking strategies (Davis, 1997). Nadelson
et al. (2014) emphasize, “as with any K-12 educational reform effort, the effectiveness of
the CCSS is largely dependent on the knowledge and perceptions of the educators who
will implement the standards” (p. 48). Educators need effective tools in order to
effectively implement curriculum in their classrooms, especially during a time of reform
where classroom practice is expected to look different than it traditionally has before
(Porter, Fusarelli, & Fusarelli, 2014).

Design-Based Learning, as defined here, serves to meet the demands of the CCSS
by providing teachers a methodology designed to teach students content, civic skills,
persistence in problem solving, and communication of novel ideas and solutions to
problems (Nelson, 1984), all of which are components of the CCSS framework (Porter et
al., 2011). The CCSS for mathematics model the idea that a spiraled curriculum that
increasingly builds upon itself is useful for building knowledge. Johnston (2012)
presents major tenants of the spiral curriculum based on Jerome Bruner's work. These
include:

1. Topics or themes are revisited frequently throughout a students’ school
career

2. The complexity of topics increase every time they are revisited
3. New learning builds upon and is related to old learning and refers back to the context of the old information.

Teachers pose increasingly more difficult problems to students that require increasingly more complex solutions. However, the context for learning is established early in a course and is constantly referred to as students partake in the logical progression of curriculum that constantly builds upon itself (Nelson, 2006).

The designs created by the Backwards Thinking™ approach are simple in structure, but it is the students’ abilities to justify their design that unlocks creativity and allows for application of learning to occur (Nelson, 1984). It is in this manner that DBL lends itself to a student-centered classroom. In designing a city and its elements, students get to experience collaborative decision making and problem solving activities as they organize the classroom as a microcosm. Students exhibit leadership skills and are challenged to create new systems of organization, by improving their classroom environment. Teaching students to solve problems through their experiences within their city model gives them something to which they can relate their content learning. This teaches students to create original solutions to problems before studying historic and contemporary views, which activates creative thought. (Nelson, 1984).

In their book, *Theoretical Foundations of Learning Environments*, Jonassen and Land (2012) contend, “student-centered environments, tacitly or explicitly, are designed to support individual efforts to negotiate meaning while engaging in authentic activities” (p. 4). However, “activity is regarded as necessary but not sufficient for learning. Reflection on the perceptual and conscious actions is necessary for constructive meaning” (Jonassen & Land, 2012, p. ix). Creating independent learners, curious and
excited to solve problems is an aim of DBL. In addition, students are taught to be reflective through their constant revisions of their physical artifacts so that their critical thinking skills can develop, and they gain confidence in their learning.

Summary

A student-centered classroom allows for students to go beyond what would traditionally be expected in that they are encouraged to pose their own questions, generate novel ideas for solving those problems, and are able to make and learn from mistakes (Davis et al., 1997). Implementing design strategies in classrooms shows students “increasing motivation, developing higher-order cognitive skills, and fostering personal and interpersonal traits” (Doppelt & Schunn, 2008, p. 198). These skills would ensure that students would be able to meet the learning outcomes as outlined in the CCSS. “The need for self direction especially in 21st century classroom is underlined by the need for more of learner centered and less teacher dominated learning environment” (Ultanir, 2012, p. 201). The current shift in educational reform efforts leans toward teachers designing a student-centered learning environment and curriculum so that students can acquire the necessary content knowledge and skills as outlined in the CCSS. Design-Based Learning could be a methodology that teachers utilize in their curriculum design in order to meet these requirements. As Davis (1998) established over twenty-five years ago, teachers who currently implement DBL methodology do so for the purpose of enhancing critical thinking skills, promoting student-directed learning, developing students’ interpersonal and communication skills, promoting a culture of revision, and cultivating responsible citizens. The next chapter will present a description and rationale of the methodology implemented in this study in order to address the research questions.
CHAPTER 3: METHODOLOGY

Chapter 2 presented a review of pertinent literature related to this study. This chapter provides a description of the methodology applied for data collection, a rationale for the selection of the research methodology, and an explanation of how this method aimed to answer the research questions through careful analysis of collected data. The purpose of this study was to determine how DBL methodology contributes to students’ growth in skill areas related to creativity and how it contributes to teachers’ growth in use of instructional and creative strategies to promote creativity. Three research questions were developed to guide this study:

1. How does DBL methodology contribute to students' growth in skill areas related to creativity?
2. How does DBL methodology contribute to teachers' growth in use of instructional strategies to enhance creativity?
3. How does DBL methodology contribute to teachers' growth in assessment strategies to promote creativity?

In order to address the research questions, a qualitative multicase study was conducted. Data collection included one-on-one interviews, focus group interviews, recording of journal notes related to the interviews and observations of classroom spaces, and archival data analysis. Data were coded in order to illuminate emergent themes across the three cases of study.

Rationale for the Research Design

Definitions of qualitative research show some variation depending on the author or theorist describing the concept, however, identifying commonalities between multiple
definitions of qualitative research reveals that it is a way of studying phenomena in a systemic manner in order to understand and determine meaning of the interactions between people, the phenomenon in question, and the natural setting in which those components exist (Berg, 2007; Creswell, 2012; Lichtman, 2014; Merriam, 2009; Stake, 2006). Qualitative research strategies will be implemented in this study in order to understand the relationship between utilizing Design-Based Learning as a teaching methodology and students’ ability to demonstrate creativity in their classroom settings.

**Characteristics of Qualitative Research**

According to Creswell (2012), when conducting research, a qualitative design can be an appropriate choice for the researcher because “literature might yield little information about the phenomenon of study, and you need to learn more from participants through exploration” (p. 16). Research on the impact of DBL in the classroom in relation to recent educational policy reform is limited, despite the fact that DBL has been implemented in classrooms and other educational settings for over thirty years (Nhem, 2015). In *Doing Case Study Research: A Practical Guide for Beginning Researchers*, Hancock and Algozzine (2006) argue, “if little is known about an issue, a qualitative approach might be more useful” (p. 8). A qualitative research design was determined to meet the needs of this study in regards to closing the gap in knowledge about the implementation of DBL principles in relation to teachers teaching and assessing student creativity in K-12 classrooms.

In order to ensure that the design chosen for this study meets the standards of qualitative research, the guidelines shown in Table 3.1, adapted from Lichtman (2014), were considered.
Table 3.1

Summary of Qualitative Research Characteristics

<table>
<thead>
<tr>
<th>Qualitative research <em>is not:</em></th>
<th>Qualitative research <em>does:</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>interested in testing hypotheses</td>
<td>look at human interactions in natural settings</td>
</tr>
<tr>
<td>looking for cause and effect</td>
<td>look at the whole, not isolated variables</td>
</tr>
<tr>
<td>wanting to generalize from a sample to a population</td>
<td>describe and explain the world</td>
</tr>
<tr>
<td>wanting to look at specific variables</td>
<td>rely heavily on the researcher</td>
</tr>
<tr>
<td>interested in drawing inferences</td>
<td></td>
</tr>
<tr>
<td>about reliability, validity, and generalizability</td>
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</tbody>
</table>

Adapted from Lichtman (2014)

The above table sheds light on the distinguishing characteristics that set qualitative research apart from quantitative methods of research. Multiple researchers agree that qualitative research methods are focused on revealing the meaning behind a particular phenomenon and relies on the researcher synthesizing data in order to provide a description of the concept being studied (Berg, 2007; Creswell, 2012; Lichtman, 2014; Merriam, 2009; Stake, 2006). Although qualitative research is characterized by a researcher’s analysis of a phenomenon, it goes beyond a mere description. Lichtman (2014) argues, “it is the researcher’s role to bring understanding, interpretation, and meaning as they examine data” (p. 38).

Various qualitative research designs exist. One form of qualitative research, case study, provides a researcher a way of studying a phenomenon occurring in one or multiple distinct settings to explain the *how* and *why* of that particular phenomenon or
concept (Yin, 2013). This particular study was conducted through implementation of a multiple case study research design.

**Multicase study.** A popular method of qualitative research in education is the case study. Case studies are implemented in a bounded system, meaning that the research setting and the participants are carefully defined during the design of the study (Berg, 2007; Lichtman, 2014; Merriam, 1988; Merriam, 2009; Stake, 2006). Merriam (2009) states that the unit of analysis being studied “could be a single person, a group, an institution, a community, or a specific policy” (p. 40) and it is what defines a case study, rather than the topic being investigated. Lichtman contends, “it is up to the researcher to identify the case and set limits or boundaries” (p. 118). This particular study examined the use of DBL principles to teach and assess creativity across three distinct cases, thus defining it as a multiple case study.

A justification for the selection of a multiple case study design is supported by Yin (2013) where he states, “study of school innovations, such as the use of new curricula” (p. 46) as being a common example of the multiple case study design. In addition, Stake (2006) asserts, “one of the most important tasks for the multicase researcher is to show how the program or phenomenon appears in different contexts” (p. 27). Thus, multiple schools where an adopted curricular program, such as the DBL methodology, is being implemented can be studied as individual cases but they all contribute to the overall understanding of the phenomenon being studied (Yin, 2013).

According to Merriam (2009), “collective case studies, cross-case, multicase, or multisite studies” (p. 49), are all synonymous terms used to describe multiple case studies. Hancock and Algozzine (2006) use the term collective case study when
rationalizing the selection of such a design. They state, “Collective case study research attempts to address an issue in question while adding to the literature base that helps us better conceptualize a theory” (Hancock & Algozzine, 2006, p. 33). Since the literature is limited in terms of the relationship between DBL methodology and teaching and assessing creativity, the selection of a multicase design was chosen with the aim of providing a rich account of this phenomenon in order to contribute to the literature available for other educators.

Site and Participant Selection

Purposeful sampling is an intentional practice where the researcher chooses participants and sites based on pre-determined characteristics that are known to give rich information about the topic of study (Creswell, 2012). In designing this multicase study, three cases were identified where teams of collaborating teachers currently implement the DBL methodology. A detailed description of the identified cases of study is provided in Chapter 4 in order situate the collected data within a context. Although relatively few cases were selected where many multicase studies utilize several sites or cases for study (Berg, 2007; Merriam, 2009; Stake, 2006), Yin (2013) notes, “the analytical benefits from having two (or more) cases may be substantial” (p. 53). He further describes a multicase study as being appropriate for analyzing cases where it is known that there has been previous success in working with the phenomenon of study:

The simplest multicase design would be the selection of two or more cases that are believed to be literal replications, such as a set of cases with exemplary outcomes in relation to some evaluation theory. Selecting such cases requires prior knowledge of the outcomes, with the multiple-case inquiry focusing on how
and why the exemplary outcomes might have occurred and hoping for literal (or direct) replication of these conditions from case to case. (p. 52)

For the three cases selected for this study, each of the collaborating teams of teachers include teachers who are well-versed in the DBL methodology because they regularly utilize DBL principles in their curriculum design and delivery of instruction, where some of them are currently studying the methodology through immersion in the university Masters of Arts program in Education with a focus on DBL at Cal Poly, Pomona.

Yin (2013) compares implementing a multicase study research design to conducting experiments to justify selection of two cases rather than one. He states, “analytic conclusions independently arising from two cases, as with two experiments, will be more powerful than those coming from a single case (or experiment) alone” (p. 53). Applying a multicase design to this study lent itself to providing a rich, thick description of the phenomenon in question (Berg, 2007; Creswell, 2012; Hancock & Algozzine, 2006; Lichtman, 2014; Merriman, 2009; Yin, 2013), that is, the why and how of the relationship between DBL and creativity in the classroom.

Data Sources

For this study, a variety of data sources were used. Data collection methods, such as interviews, observations, field notes, focus groups, and archival data analysis provide multiple sources of evidence in case studies that help explain a phenomenon in particular settings (Creswell, 2012; Denzin and Lincoln, 2011; Hancock and Algozzine, 2006; Stake, 2006; Stake, 1995; Yin, 2013). This particular study was situated around semi-structured participant interviews. For two of the cases of study, the interviews were
conducted with participants in a focus group setting. Direct observation of the classroom space at the school sites defined for these cases were recorded through field notes. Completed thesis projects of three of the participants from these two cases were analyzed. For the third case identified for this study, one-on-one interviews were conducted rather than focus groups because the participants practiced the DBL methodology within different school contexts.

**Trustworthiness**

In order to defend the rigor of qualitative research, the researcher must consider components of trustworthiness (Vogt, Gardner, & Haeffele, 2012). Often referenced and often debated, credibility, dependability, transferability, and confirmability are the four considerations for evaluation of qualitative studies described by Lincoln and Guba (1985) in their book, *Naturalistic Inquiry*, Vogt, Gardner, and Haeffele provide a more streamlined definition of trustworthiness as “the conceptual equivalent of validity applied to research on qualitative data” (p. 355). It is in the data analysis strategies that a qualitative researcher can defend their study as trustworthy, or in other words, possessing the rigors of validity and reliability (Lincoln & Guba, 1985; Vogt, Gardner, & Haeffele, 2012; Yin, 2013).

**Data Collection and Analysis**

Terms used to describe the criteria used by researchers to evaluate qualitative research has evolved over the decades (Merriam, 2014), but contemporary researchers agree that analysis of data must be considered carefully by a researcher in order to ensure the rigor and acceptability of the study (Creswell, 2012; Merriam, 2014; Stake, 2006; Yin, 2013). Berg (2007) states, “taken together, the transcription and the observer notes
provide a complete record of the discussion that unfolded during the focus group interview and will assist in analysis of this data” (p. 163).

**Role of the Researcher**

For this study, the researcher acted as the sole collector and analyzer of the data. For two of the cases, a homogenous focus group discussion composed of four DBL teachers was conducted in order to determine how DBL fosters creativity in their classrooms. One-on-one interviews were held with four teacher participants who were part of the third identified case. Classroom observations were completed at the school site of the first two cases where each of the first two groups of four teachers worked together. Since direct observation was not possible in the four different classrooms of the teacher participants in the third case, they provided photographs of their classrooms that were analyzed similarly to the actual classrooms of the first two cases in order to understand what DBL looks like in practice within the physical space of classrooms. Finally, three completed thesis projects published by three of the teacher participants were analyzed in order to understand those teachers’ growth in use of the DBL methodology through participation in the Master of Arts program in Education with a focus on DBL at Cal Poly, Pomona.

As a DBL teacher and trainer of other DBL teachers, the researcher had an understanding of the DBL methodology and its implementation. In addition, at the time of this study, the researcher was a classroom teacher implementing the DBL methodology. Gaps in the researcher’s knowledge and understanding of the DBL methodology in various contexts led to a reflexive stance being taken during the planning and conducting of this study.
**Reflexivity in qualitative research.** Reflexivity is the process by which the researcher in a study practices ongoing reflection about their role in the study (Creswell, 2012; Denzin & Lincoln, 2011; Lichtman, 2014; Merriam, 2009; Stake, 1995). Lichtman (2014) highlights the importance of reflexivity, stating, “contemporary qualitative researchers encourage researchers to be reflexive about themselves and what they are doing” (p. 33). Furthermore, in her book, *Qualitative Research for the Social Science*, she identified three types of reflexivity:

1. Personal reflexivity refers to a researcher’s values
2. Epistemological reflexivity refers to a researcher’s view of how the world is known
3. Contextual and ethical reflexivity refer to issues related to appropriateness of doing research with some groups and issues related to informed consent. (p. 32-33)

In other words, researchers must have an awareness of their role in the research, their possible biases, and their impacts on the study site and participants, if any. This point was echoed by Creswell (2012) where he contended, “reflexivity refers to the researcher being aware of and openly discussing his or her role in the study in a way that honors and respects the site and participants” (p. 474). This continuous process of reflection during the research is necessary since the researcher is an active participant in the research and serves as the primary instrument of data collection (Creswell, 2012; Lichtman, 2014; Stake, 2006).

The researcher was aware of how personal experiences with DBL methodology could influence the study. However, qualitative research does not shun from identifying
areas of subjectivity. Rather, the researcher was clear about his position and involvement in the research in order to provide a credible analysis of the data (Lichtman, 2014).

**Positionality of the researcher.** At the time of this writing, I have successfully completed my ninth year of teaching high school science courses in the same school district in Southern California. I have implemented the Design-Based Learning (DBL) instructional methodology for five of those years, now a majority of my teaching career. I was first introduced to the teaching strategy when I attended an information session about a five-day summer DBL training and for the subsequent M.A. program focused on the methodology offered at California State Polytechnic University, Pomona. I was nearing the end of my fourth year of teaching and knew that I needed a master’s degree of “some sort” if I wanted to move up on the salary schedule. The DBL program offered most of the courses less than a mile from where I was living at the time, and I learned that the program would center on what I was teaching in my own classroom. I decided to enroll in the program solely from a convenience standpoint, with the knowledge that after finishing in two years, I would move up to the next column on the teacher salary schedule in my district.

What started in my mind as a quick, easy, and convenient way to make more money turned into a complete evolution of my teaching style. Prior to implementing DBL, I only had four short years in the classroom. I taught using whatever lesson plan templates I was given, I did what I saw other teachers in the department do, and I felt that unsuccessful students, in some instances, were just not cut out to excel in science. As I shifted my strategies to focus on what I was learning in the DBL Master’s program, however, I learned a lot about how young people learn and how to engage them in their
learning. DBL was never developed with the idea of making teaching easier. It is quite the contrary. In fact, designing a curriculum utilizing DBL principles required me to be more creative than I ever had to be as a teacher. I was challenged to constantly alter my classroom activities depending on the context of the situations that arose as I began to share ownership of the classroom with my students. However, the challenges I faced while changing how I thought about learning and how I chose to view my students and their struggles forced me to reevaluate what learning could and should be.

I embraced Design-Based Learning in a way I never expected when I enrolled in the program. I did so because I, along with my students, was genuinely having fun in the classroom. In addition, student outcomes improved, more students were engaged, and I no longer had students failing my courses. Committing to implementing the methodology allowed me to excel in the coursework of the program and to build a working relationship with the professor and creator of Design-Based Learning, Doreen Gehry Nelson, where we moved beyond being teacher and student and eventually became colleagues. I was given the opportunity to begin working with Professor Gehry Nelson and some other graduates of the DBL M.A. program to teach the methodology to other teachers, district administrators, and students in the DBL M.A. program at Cal Poly, Pomona. I have been doing this in various capacities for the past three years.

Summary

This chapter provided a rationale for the selection of a qualitative research design in order to answer the questions posed in this study. Specifically, a multicase study strategy for data collection and analysis was described in order to explain how it appropriately allowed the researcher to seek out information from the identified cases of
study and participants in order to illuminate the relationship between DBL methodology and creativity in the classroom. In addition, this chapter provided considerations of data collection and analysis strategies, the role of the researcher, and trustworthiness of the study. Furthermore, a justification for the selection of this research method in light of common criticisms related to case studies was presented. One such argument was the choice of analyzing three cases rather than one. Although a brief description of the characteristics shared by the three cases was presented in this chapter, a more comprehensive description of those cases will be presented in Chapter 4. Chapter 4 will also describe the collected data and present patterns and themes that emerge from analysis of that data. Chapter 5 will give an interpretation of those themes in order to draw conclusions, provide a discussion, and recommend action and further research related to the topic of this study.
CHAPTER 4: RESEARCH FINDINGS

This chapter discusses the data collected in order to illuminate teacher practices in utilizing the Design-Based Learning (DBL) instructional methodology to teach and assess creativity skills. The data collection strategies, the context from which the data were collected, and an analysis of the results from those data will be described in this chapter.

The purpose of this study was to examine teachers’ practice of creative curriculum planning in addition to how they use DBL to teach and assess the creativity skills required of students as outlined in the Common Core state standards and the P21 Framework for 21st Century Learning. The purpose of this study was to determine how DBL methodology contributes to students’ growth in skill areas related to creativity and how it contributes to teachers’ growth in use of instructional and creative strategies to promote creativity. In order to gain insight into teachers’ practices utilizing DBL methodology, this study was guided by the following research questions:

1. How does DBL methodology contribute to students' growth in skill areas related to creativity?
2. How does DBL methodology contribute to teachers' growth in use of instructional strategies to enhance creativity?
3. How does DBL methodology contribute to teachers' growth in assessment strategies to promote creativity?

In order to address these questions, a multi-case study was conducted. The three cases of interest can be characterized as follows:

- Case 1: A comprehensive high school in Southern California where four teachers teach utilizing the DBL methodology.
Case 2: An alternative education high school in Southern California where four teachers teach utilizing the DBL methodology.

Case 3: A cohort group of four teachers currently enrolled in the Masters of Arts program in Education with a focus on DBL methodology at Cal Poly, Pomona. At the time of this study, these four teachers taught at four different schools; three in elementary schools and one at a high school in Southern California.

In order to maintain confidentiality, the school and teacher participants were given pseudonyms. For the purpose of this study, Case 1 will be referred to as Darwin High School (DHS). Case 2 will be referred to as Wolf High School (WHS). When referring to Case 3 as a group, it will be called DBL Masters Cohort (DMC). A pseudonym was also assigned to each of the four schools where teachers in the DMC teach in order to differentiate student demographic data and for reference when analyzing participant interview responses.

**Data Collection Methods**

Semi-structured focus group interviews were conducted with teachers at DHS and WHS. Semi-structured, one-on-one interviews were conducted with teachers in the DMC. Focus group interviews were more appropriate at DHS and WHS as those teachers work collaboratively every day to develop and implement curriculum. One-on-one interviews were conducted with the teachers in the DMC because although they collaborate and help each other develop curriculum, the implementation of that curriculum occurs within four different contexts at four different school sites.
Observations of the physical classroom spaces were determined to be relevant to this study in order to identify evidence of the student outcomes described during the focus groups. This was completed by making direct observations of classrooms in DHS and WHS and by analyzing photographic classroom documentation from the four schools represented by the teachers in the DMC. A final step was taken to address the research questions by analyzing three completed and published projects completed by teachers who graduated from the DBL-focused Curriculum and Instruction M.A. program at Cal Poly Pomona. DHS teachers completed two of projects while one was completed by a WHS teacher.

The data were coded in order to identify patterns in DBL implementation across the three cases. These patterns became the major themes that answered each of the three research questions.

**Context of the Study**

This study was a multi-case study. The three cases of interest were Darwin High School (DHS), Wolf High School (WHS), and the DBL Masters Cohort (DMC). DHS and WHS are both high schools in Los Angeles County in Southern California where students in grades nine through twelve are served. Both schools are required to ensure that all students meet graduation and A-G requirements in order to be awarded a diploma in the state of California.

DHS is situated in a unified school district containing nine elementary schools, three middle schools (serving grades 6-8), and three comprehensive high schools. School A is one of the three comprehensive high schools where there are a variety of academic programs and offerings including an International Baccalaureate (IB) program, various
elective courses, an array of student athletics and other extra-curricular offerings, and multiple Advanced Placement (AP) course offerings. School A is similar to most comprehensive high schools in Southern California in terms of offerings both during and outside of the school day. It is a relatively large school with an enrollment of over 2,730 students.

WHS is quite different from DHS. WHS is situated in a district comprised of 16 elementary schools, seven middle schools, four high schools, and two alternative education programs for high school students. WHS is one of the two alternative high school programs offered in the district. The majority of the students are enrolled in the school in grades 11 and 12 for credit recovery purposes. Other students are enrolled because they struggle at traditional high schools due to reasons such as medical complications, bullying, being pregnant or already having a child, or the need to work greater than half time in order to contribute to their family income. WHS does not have an athletic program or a vast array of elective courses. It does, however, have career-themed courses related to the medical field, connects students with paid internships related to the medical field, and incorporates field experiences into classroom learning. Regardless of the alternative education designation, WHS is similar to a comprehensive high school in that all course offerings are A-G approved and meet the requirements of graduation and the awarding of a diploma in the state of California. It should be noted that WHS has a much smaller student population of approximately 200 students. Although the data presented below states an enrollment of 194, that exact number changes often as there is much fluidity in the student body. The reason for this is that after a student has successfully recovered their previously lost credits, he or she
sometimes transfer to one of the comprehensive high schools in the district. The school also enrolls additional students during the school year; however, the enrollment count is always near 200. Students at this school can complete required courses through independent study, an online program, or in a teacher-led setting, where they attend daily seminar classes with a group of peers as they would at a comprehensive high school. The teacher participants from WHS taught those seminar classes.

The DMC is comprised of three elementary school teachers and one high school teacher who all teach at different schools. All four schools, like DHS and WHS, are located in Los Angeles County in Southern California. The students served at these schools form a diverse population of learners.

Participants

Teachers at the schools that were part of each case of study agreed to participate in semi-structured interviews, where they would share their experiences using DBL in their classrooms as they answered interview questions in a semi-structured format. The teachers at both school sites where focus group interviews were conducted, DHS and WHS, taught different grade levels and different subjects. In order to maintain confidentiality, teachers’ names have been replaced with pseudonyms. In this document, the teachers at DHS will be referred to as Jonathan, Ashlie, Lindsey, and Michael. The teachers at WHS will be referred to as Devin, Christian, Hailey, and Efrain. Participants who are part of the DMC each teach at different schools. Pseudonyms are also used for these schools and participants.

The teachers at DHS were teachers of various English, social science, and mathematics courses at the school. They formed a small cohort of teachers who all
consistently utilized DBL as they designed their instructional activities to include practices of the DBL methodology into a year-long curriculum. Two of the teachers were formally trained as they successfully completed the Curriculum and Instruction M.A. program with an emphasis on DBL at Cal Poly, Pomona. The other two teachers were trained to use DBL by the two DBL M.A. graduates. In addition, the four teachers’ classrooms were near each other in order to aid in their collaboration.

The teachers at WHS were also teachers of differing subjects, including mathematics, science, English, and social science. Two of the teacher participants were formally trained in DBL and successfully completed the MA program at Cal Poly Pomona. The other two teachers were trained in the methodology by the other three. Similar to DHS, the teachers at WHS had the time and space to collaborate on curriculum development.

The teachers who were part of the third case of study, the DMC, taught various grade levels and subjects. Jeanette taught high school English at Gordon Rocks High School (GRHS), Jessica taught kindergarten at Roca Partida Elementary School (RPES), Isabel taught fourth grade at Socorro Elementary School (SES), and Keleen taught second grade at San Benedicto Elementary School (SBES). These teachers comprise a single case of study because they are all connected as current students in the DBL-related M.A. program in Curriculum and Instruction at Cal Poly, Pomona. They collaborate to design their respective curriculum, although they each implement that curriculum at different school sites. Their shared experience in implementation of DBL is though their coursework in the program and their ongoing collaboration and communication of ideas regarding curriculum design. Additionally, each of these teachers have participated in
advanced study of the DBL methodology through voluntarily shadowing and assisting
trainers of the DBL during professional development opportunities for teachers
considering entering the DBL-related M.A. program at Cal Poly, Pomona.

Table 4.1 presents the pseudonyms assigned to each school and teacher in this
study. Additionally, the grade or subject taught by each teacher is presented.

Table 4.1

*Schools, Teachers, and Their Positions by Pseudonym and Grade or Subject Taught*

<table>
<thead>
<tr>
<th>School (Pseudonym)</th>
<th>Teacher Name (Pseudonym)</th>
<th>Grade/Subject Area Taught</th>
</tr>
</thead>
<tbody>
<tr>
<td>Darwin High School (DHS)</td>
<td>Jonathan</td>
<td>English</td>
</tr>
<tr>
<td></td>
<td>Ashlie</td>
<td>English</td>
</tr>
<tr>
<td></td>
<td>Lindsey</td>
<td>Mathematics</td>
</tr>
<tr>
<td></td>
<td>Michael</td>
<td>Social Science</td>
</tr>
<tr>
<td>Wolf High School (WHS)</td>
<td>Devin</td>
<td>English</td>
</tr>
<tr>
<td></td>
<td>Christian</td>
<td>Social Science</td>
</tr>
<tr>
<td></td>
<td>Hailey</td>
<td>Science</td>
</tr>
<tr>
<td></td>
<td>Efrain</td>
<td>Mathematics</td>
</tr>
<tr>
<td>Gordon Rocks High School (GRHS)</td>
<td>Jeanette</td>
<td>English</td>
</tr>
<tr>
<td>Roca Partida Elementary School (RPES)</td>
<td>Jessica</td>
<td>Kindergarten</td>
</tr>
<tr>
<td>Socorro Elementary School (SES)</td>
<td>Isabel</td>
<td>4th Grade</td>
</tr>
<tr>
<td>San Benedito Elementary School (SBES)</td>
<td>Keleen</td>
<td>2nd Grade</td>
</tr>
</tbody>
</table>

Table 4.2 displays recently published student demographic for each school. These
data are presented to give a context about the student population served at each school.

These data were adapted from the 2014-2015 Accountability Report Card (SARC)
document for each school. The only exception is that the 2013-2014 SARC data was used
for DHS because inaccuracies were discovered regarding student demographic data reported for the school in the 2014-2015 school year.

Table 4.2

*Student Enrollments by Group at Darwin High School and Wolf High School*

<table>
<thead>
<tr>
<th>Group</th>
<th>Percent of Total Enrollment DHS</th>
<th>Percent of Total Enrollment WHS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black or African American</td>
<td>2.7</td>
<td>11.6</td>
</tr>
<tr>
<td>American Indian or Alaska Native</td>
<td>0.2</td>
<td>0</td>
</tr>
<tr>
<td>Asian</td>
<td>53.5</td>
<td>1.0</td>
</tr>
<tr>
<td>Filipino</td>
<td>8.0</td>
<td>0</td>
</tr>
<tr>
<td>Hispanic or Latino</td>
<td>25.9</td>
<td>72.2</td>
</tr>
<tr>
<td>Native Hawaiian or Pacific Islander</td>
<td>0.8</td>
<td>1.5</td>
</tr>
<tr>
<td>White</td>
<td>8.3</td>
<td>11.1</td>
</tr>
<tr>
<td>Two or More Races</td>
<td>0.7</td>
<td>2.5</td>
</tr>
<tr>
<td>Socioeconomically Disadvantaged</td>
<td>16.4</td>
<td>57.6</td>
</tr>
<tr>
<td>English Learners</td>
<td>7.7</td>
<td>11.6</td>
</tr>
<tr>
<td>Students with Disabilities</td>
<td>7.7</td>
<td>0.5</td>
</tr>
<tr>
<td>Foster Youth</td>
<td>0.2</td>
<td>2.0</td>
</tr>
</tbody>
</table>
Table 4.3

*Student Enrollments by Group at GRHS and RPES*

<table>
<thead>
<tr>
<th>Group</th>
<th>Percent of Total Enrollment GRHS</th>
<th>Percent of Total Enrollment RPES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black or African American</td>
<td>1.5</td>
<td>3.7</td>
</tr>
<tr>
<td>American Indian or Alaska Native</td>
<td>0.3</td>
<td>0.2</td>
</tr>
<tr>
<td>Asian</td>
<td>3.2</td>
<td>6.2</td>
</tr>
<tr>
<td>Filipino</td>
<td>3.7</td>
<td>5.4</td>
</tr>
<tr>
<td>Hispanic or Latino</td>
<td>89.9</td>
<td>76.1</td>
</tr>
<tr>
<td>Native Hawaiian or Pacific Islander</td>
<td>0</td>
<td>0.6</td>
</tr>
<tr>
<td>White</td>
<td>1.3</td>
<td>6.7</td>
</tr>
<tr>
<td>Two or More Races</td>
<td>0.3</td>
<td>1</td>
</tr>
<tr>
<td>Socioeconomically Disadvantaged</td>
<td>92.4</td>
<td>76.1</td>
</tr>
<tr>
<td>English Learners</td>
<td>12.2</td>
<td>11.6</td>
</tr>
<tr>
<td>Students with Disabilities</td>
<td>13.5</td>
<td>7.7</td>
</tr>
<tr>
<td>Foster Youth</td>
<td>2.6</td>
<td>0.8</td>
</tr>
</tbody>
</table>

Table 4.4

*Student Enrollments by Group at SES and SBES*

<table>
<thead>
<tr>
<th>Group</th>
<th>Percent of Total Enrollment SES</th>
<th>Percent of Total Enrollment SBES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black or African American</td>
<td>4.9</td>
<td>1.6</td>
</tr>
<tr>
<td>American Indian or Alaska Native</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Asian</td>
<td>0.2</td>
<td>56.6</td>
</tr>
<tr>
<td>Filipino</td>
<td>0</td>
<td>4.1</td>
</tr>
<tr>
<td>Hispanic or Latino</td>
<td>94.5</td>
<td>25.7</td>
</tr>
<tr>
<td>Native Hawaiian or Pacific Islander</td>
<td>0</td>
<td>0.3</td>
</tr>
<tr>
<td>White</td>
<td>0.3</td>
<td>7.9</td>
</tr>
<tr>
<td>Two or More Races</td>
<td>0</td>
<td>3.6</td>
</tr>
<tr>
<td>Socioeconomically Disadvantaged</td>
<td>97.4</td>
<td>35.8</td>
</tr>
<tr>
<td>English Learners</td>
<td>54.5</td>
<td>32.5</td>
</tr>
<tr>
<td>Students with Disabilities</td>
<td>10.9</td>
<td>9.3</td>
</tr>
<tr>
<td>Foster Youth</td>
<td>1.2</td>
<td>0.3</td>
</tr>
</tbody>
</table>
Tables 4.2, Table 4.3, and Table 4.4 offer demographic data only for comparison of the student body in each school related to the cases of interest in this study. The aim of this study was not to disseminate data based on any particular student group. In fact, the data did not reveal anything specific in terms of teachers’ experiences using DBL and student outcomes of specific demographic groups besides mentions at DHS, WHS and GRHS regarding the performance of students with disabilities. This will be discussed in the analysis of data.

**Analysis of Data**

Data were analyzed as they pertained to each of the research questions guiding this study. The data were coded to reveal themes that emerged across all three cases of study. The analysis of this data is organized as the themes addressed each of the research questions. Following the analysis of the data will be a summary tying the themes together. Conclusions regarding this data will be discussed in Chapter 5.

**Research Question 1: How does DBL methodology contribute to students' growth in skill areas related to creativity?** In order to address research question 1, responses from focus group and one-on-one interviews were analyzed in order to find patterns that spoke to the growth students demonstrated in each of the eight areas characterized as being part of the creativity standards described in the P21 Framework. Additionally, journal notes documenting observations of the physical learning space in DHS and WHS were analyzed in concert with photographs of the learning space in the classrooms of the DMC teacher participants in order to identify products of learning created by students that provide evidence of meeting the creativity standards. Finally,
three completed M.A. projects were analyzed to discern student growth in creativity skills as reported by participating teachers who completed the DBL-related M.A. program.

Three themes emerged while addressing this question. The researcher found that learning through engagement in activities associated with the DBL methodology contributes to student growth in creativity through:

1. Developing presentation skills
2. Planning, executing, and revising work
3. Building meaningful relationships with peers.

The themes that emerged were evident across all cases: DHS, WHS, and the DMC.

**Theme 1: Developing presentation skills.** Participating teachers were asked about their students’ presentation skills. Jonathan at DHS shared, “I think with our presentations, because we do them so often, I can have a higher level of presentation skill that I could expect.” This response led to a follow up question asking for examples that would demonstrate that students have advanced skills in presenting to an audience. In response, Jonathan elaborated on the answer:

I feel like the students that are afraid of it, don't stay afraid of it, because at this point in high school, they should have been presenting through elementary school and junior high. If they're still afraid of it, that's a general fear that they've held onto, and they probably think that they're going to have that for the rest of their life, but they get so used to getting up and speaking in here. This is something everyone has to do. We have students that were either just terrified at the beginning of the year, and they were always nervous about it. We have students that were bawling in
tears. We had a student who was a non-verbal, since the first grade, she hadn't said a word in school. By the end of the year, she was talking to us. This is a student who hadn't spoken to anyone in school since first grade who is talking now.

This type of answer was not unique. Devin at WHS shared a similar account of a non-verbal, special needs student demonstrating an increased sense of confidence in her classes:

I think my students’ presentation skills have greatly improved. Just thinking about the student that I have who has Asperger's who would never even speak out in class, is so excited to explain her creature that she created or to talk about her city that she came up with. It's just been incredible to watch. It’s what happens when it's truly theirs. They own it.

Following Devin’s account, Efrain added, “They can carry that same passion and momentum into the next challenge or into another class to try to create something they feel is important.”

It was interesting that Efrain mentioned student performance regarding student presentation and speaking skills outside of DBL classes. When asked the same question at DHS, Lindsey painted a similar picture:

I hear from our students that when they're in their other classes, they're always the best ones. They're proud of that, because they might not always be the best in every academic area, but they're proud that they get up there. Presenting is so much easier now that they've had all this experience [in their DBL classes].
These experiences were not isolated in high school settings. Keleen, a second grade teacher at SBES, shared, “I've never seen so many great presentations. A little girl who used to literally cry and duck down any time she had to speak at all, even though it took her longer, was eventually up there defending her work.” Surprisingly, every teacher in the DMC shared that their English Learners especially excelled at presenting their work in class because it was something which teachers required some variation of in class every day using the DBL methodology. In each case, it was not only the high-achieving students expected to excel at presentations that were being singled out by these teachers. Many had a story they shared about a student whose growth in this area could be seen as an unusual outcome.

Observations of the learning space in each school, whether by direct observation or by review of photographic evidence, supported the stories of the teachers. In each instance, there was a complete lack of any pre-packaged, content-related material such as posters or models created by some sort of educational company. Instead, everything that was displayed in the room was student-created. Student work samples were displayed throughout each classroom. When asked about which students have work displayed in the classroom, every DBL teacher, regardless of school site or student age group, explained that every student had some of their work on display. Not only was oral presentation a common requirement of these students, the physical presentation of their work was also an important aspect of DBL that these teachers felt would help students communicate their learning.

The stories shared by teachers were not examples of immediate student achievement, however, these instances were descriptive of outcomes that were achieved
over time. Across all cases, teacher participants shared that an integral part of the DBL methodology was the idea that students spend sufficient time planning and brainstorming ideas for the models they build and a considerable amount of time revisiting their work for the purpose of revision.

**Theme 2: Planning, executing, and revising work.** Across all three cases of study, participants communicated that successful presentations and communication that they observed was the result of their students demonstrating growth through multiple iterations of their work. The high level of presentation skill that was referred to previously in one of Jonathan’s responses to an interview question was reached through students engaging in planning, providing and receiving feedback from their teachers and peers, and revising their work based on that feedback.

Efrain explained that “encouraging them [students] to brainstorm as a first step, and making sure that they go through the planning phase after getting the criteria” is the first thing that teachers at DHS do when challenging their students to design and build an object to serve as an analogy for their learning. It was no different at WHS. Christian explained in similar language, “We encourage students to sit together as a group and plan first. That way, they can get ideas and do like a brainstorm.” All of the DBL teachers agreed that giving students the time and space to first plan before responding to any prompt taught them how to approach problems that needed to be solved. Elementary school teacher participants in the DMC also individually shared that they recognized the importance of the planning process. Keleen shared that her students often encouraged each other to try different things. The practice of brainstorming was evident across all cases.
The DBL methodology asks for students to build Never-Before-Seen (NBS) solutions to stated problems through model building. Referring to the process, Lindsey shared that “there are multiple opportunities to change it and fix it and adjust it.” The rest of the teachers at DHS agreed with Lindsey’s analysis of the revision process, describing particular instances of student performance in this area.

There was significant discussion about revision and how the teacher participants at all schools work to ensure students are comfortable with the process in all classes. They shared the sentiment that this is usually something that is left for English teachers to do in their classroom, but across all three cases, this practice takes place during all of the students’ DBL class experiences, regardless of content area. Ashlie shared:

After building challenges, we make sure that we do a lot of debriefing and reflection on what they've created, so that when we do the process of making connections between the projects that they built and the curriculum, we help them see those connections, and [lead] them in that direction.

It is not just revision for the sake of revision and creating a better looking product. The process of elaboration and refinement in DBL is meant for teachers to ensure that students are appropriately adding to their understanding of the content through their revision.

Lindsey described her strategy of teaching students to learn from their mistakes by utilizing the ideas in the P21 Framework:

You know, using the language in P21, students create new and worthwhile ideas, by elaborating, refining, analyzing, evaluating. Those are all things
that are part of the DBL process. You don't just build something, present it, and be done with it. You build it, you present it, you analyze it, you evaluate it, possibly revise it, communicate about it. Sometimes, they [students] are trying to convince other people to accept their design over somebody else's design, so there's a lot of defense of your ideas and what you've done.

Teachers at WHS communicated a very similar structure in their class where they plan for and give time to the revision process. Hailey simply stated, “It isn't just enough to put something down on paper or put something together. They actually have to actively think their way through it, revise it.” The other three teachers at WHS agreed with this statement.

A similar experience was described by the DMC participants who teach the lower grade levels. This was also seen when analyzing observation notes and photographic documentation of the participant’s classrooms. Across all cases, it was evident that multiple iterations of students’ work were displayed in the classroom, not just finished products. “Sometimes the ‘mistake’ is left up for a long time,” Hailey at WHS explained. She added, “It doesn’t make sense to hide the ‘mistake,’ or the first or second draft of something. If we did that, I don’t think they [students] would remember what not to do the next time.”

Analyzing completed M.A. projects supported this theme. Within the text of the projects, all three teachers by which the projects were written described some variation of the revision process. What was not revealed in the interviews was exactly when this occurs. Regarding revision of the models built by students, all three M.A. projects
referred to Guided Lessons that were designed to teach content-specific content. These
guided lessons were taught between the first attempt at a particular model building
activity and the revision of that model. The lessons, as described in the text, were taught
to teach students the content or ideas that they were required to apply to their re-designs.
Sometimes, depending on the building challenge, this led to teachers making revisions
first to the criteria lists before asking students to revise their designs. The practice of
teaching content between the first and subsequent attempts at a piece of work was carried
beyond the building challenges in the classrooms of each of these teachers. The same
strategy was applied to other activities such as crafting a research paper, completion of a
homework assignment, and giving presentations to peers.

All participants across the three cases, in some way, characterized their students
as being able and willing to plan and carry out a solution to a problem, presenting that
solution to receive feedback, being able to provide feedback to and receive feedback from
peers, and making adjustments to their work based on that feedback. Multiple teacher
participants made a point to share that the collaboration required in the planning and
feedback stages of student work would not be possible if their students hadn’t practiced
those skills multiple times, thus building working relationships with their peers. It is in
these relationships built between students, participants explained, that their students
really showed growth in their learning and acquisition of skills related to creativity.

**Theme 3: Building meaningful relationships with peers.** Across all cases,
teachers talked about collaboration among students being tremendous when compared to
non-DBL classrooms. At DHS, Michael shared:
When they're in a group, kids that you normally wouldn't see cooperating or talking to each other, or doing other things with each other, they're more likely to do that as a result of being in a DBL class. I think it’s just because they have to work together, and then they learn a lot more about each other than they probably would in any other environment.

This comment gave way to discussion among the teachers describing their observations of student interactions over the years at their school during the time of them implementing the DBL methodology. They have witnessed students behaving more collaborative by both in and out of the classroom. They explained that their students see themselves as a family and even socialize outside of class, where otherwise they would normally not see those particular students together. Jonathan shared, “I think the biggest thing about these classes that I've seen that is very fulfilling is the camaraderie that they have built, and the relationships they gain, because we get a lot of anti-social kids, I'd say.” This statement shows that for some of the students, this collaborative behavior is atypical and was not observed prior to them being in the DBL classrooms. However, this behavior was not just observed in the classroom. Lindsey described how the working relationships that students engaged in during class were also flourishing within other contexts:

Even the way they support each other outside of class, too, where I'm like sitting in a choir performance, and I'm like, “Why are the ‘cool’ kids here, right? Why are they watching this choir thing?” It's because their friend is up there, a friend that they probably wouldn't have had a couple of years ago. It's like, “Why are the ‘dweebs’ at the football game?” It's good. It
doesn't really fit into their normal high school bubble, but they're willing to actually break out of that, outside of just the classroom. It's not like they're just friends here because they have to be. They are friends outside of class too. This unexpected mix of kids is like [the movie], *The Breakfast Club.*

The other teachers laughed and agreed. The qualities that students learned about each other led to them forming relationships beyond the classroom.

Teachers at WHS echoed this unexpected formulation of social groups in response to collaboration in the classroom. Devin shared:

They [students] are far more comfortable going to each other with a problem first. You're used to, as a teacher in a classroom, where either they're silent about a problem, or they'll come to you, the teacher, first, and want you to solve it. These kids will go to each other and try to solve it, because they're comfortable to be able to do that.

These teacher participants felt that utilizing the DBL methodology is empowering their students to be active participants in their school community and with other students with which they typically would not be expected to socialize. They all shared that this was not a typical occurrence even in their own classrooms prior to them teaching using DBL as an instructional methodology.

These three themes demonstrate how the Design-Based Learning methodology contributed to students’ growth in the skills related to creativity as described in the P21 Framework for 21st Century Learning. DBL teachers facilitate the process of their students developing presentation skills, planning, executing, and revising work, and
building meaningful relationships with their peers. These actions, as described in the data sources, built students’ skills as their teachers gave them the time and space to be creative and learn from their mistakes.

**Research Question 2: How does DBL methodology contribute to teachers’ growth in use of instructional strategies to enhance student creativity?** The second research question explored how the teacher participants of this study grew in their use of instructional strategies related to DBL in order to elicit creativity from students. The same data sources collected across the same three cases of study that were analyzed to answer research question 1 were utilized, only this time with a focus on teacher practice rather than specifically on student outcomes.

Two themes emerged while addressing this question. It was found that teachers grow in using a variety of instructional strategies to enhance student creativity through:

1. Collaborating with other teachers
2. Engaging in ongoing reflection and adjustment of curriculum

The themes that emerged were evident across all cases; DHS, WHS, and the DMC.

**Theme 1: Collaborating with other teachers.** Collaboration among teachers was the central theme that emerged from the data related to this research question. Across all three cases of study, the teachers worked collaboratively in some sort of cohort group. They had the time and space specifically for engagement in collaboration with their peers.

At DHS, the four teachers shared common planning time, developed a common context that tied together the teaching of each of the separate subjects, and they had classroom space in close proximity to each other. The teachers at DHS expressed that the
rest of the staff at their school do not display the level of collaboration that they do between themselves. Ashlie stated:

"I think it's unusual, just to start with, that we have English, and history, and a math teacher, who come together and plan a year-long curriculum. Just the fact that those 3 curricular areas get together and map out a year-long plan for 3 different grade levels…you just don't see that kind of collaboration among teachers on a high school campus in a lot of…in most cases.

Observing the classroom space made it evident that these teachers worked as a team. The four classroom spaces were comprised of four bungalows, slightly separated from the rest of the school’s buildings by a recreational area and a parking area. Each of these four classrooms, however, were connected. The teachers and students were able walk freely from one room to the next. In fact, student work seemed to spill over from one room to the next, creating the illusion of a giant learning space rather than four separate spaces. The teachers revealed that they not only shared space, but they shared many of the same students. This led to collaboration among these teachers beyond curriculum and instruction. They also collaborated in addressing student behavior and personal issues. They celebrated the successes of many of the same students and worked together when a common student struggled, even in just one of their classes.

The teacher participants at DHS also offered support when another teacher was struggling. During the focus group interview, Ashlie shared, “I think if I was completely on my own, and without using the DBL process, I don't think I would always catch or
admit to myself that something wasn't taught correctly, or that the kids weren't getting it.” The teachers at WHS mirrored many of these aspects of collaboration.

Like the DHS teachers, the teachers at WHS also had shared collaboration time and related the content of each of their separate content areas to the same context guided by shared essential questions. However, instead of multiple classrooms in close proximity, when implementing the DBL methodology, the WHS teachers shared a single classroom space. Speaking of the level of collaboration between her and her peers, Hailey said:

It's been so great because our team is already identified, so we have the English, the math, the social science, and the science, and it just couldn't come out better if it were prepackaged. It's just so cool how we watch each other's teaching…and we debrief about it all. When other people watch you, they give you ideas about your content that you wouldn’t have thought of. They give you ideas about where it can go in the context of what they want to teach, too.

The shared classroom where these teachers taught specific classes through implementation of the DBL methodology was similar to the larger space at WHS. Student models related to DBL design challenges built throughout the school year were displayed around the room. Other student work, even if completed for just one of the classes, was also displayed in this common instructional area. The teachers expressed that they also use this same space during their collaboration time in order to get ideas about what to do next with their students based on the work displayed.
The three M.A. projects that were analyzed did not give any direct indication of teacher collaboration as each project was a product belonging to a single individual. However, the teacher participants who were part of the DMC shed light on the process of developing the M.A. projects through their demonstration of collaboration. The teachers in the DMC collaborated differently than those at the other schools. They did not all teach at the same site, so their instructional space was not shared, nor were they able to work together during regular working hours. However, they all met weekly to share DBL implementation strategies, their reflections of classroom practice digitally, and feedback with each other about their classroom practice. Additionally, they collaborated on development of their M.A. projects through discussions, common writing activities, and sharing ideas during their weekly meetings. Since such a high level of collaboration among these teachers while developing their M.A. projects was undeniable, it is reasonable to suggest that the three analyzed M.A. projects also had collaborative efforts that aided in their completion. It is of note, however, that analyzing photographs of the physical classroom space of the four DMC teachers did not provide any supporting evidence of teacher collaboration. Although similarities existed in terms of displaying student work, this was not noteworthy as evidence of these teachers’ collaboration with each other.

The importance of collaboration as related to teachers’ growth in use of instructional strategies to enhance student creativity emerged as a theme across all three cases in this study. Although it was communicated in all cases that collaboration made implementing DBL strategies easier and a more comfortable process, it was not immediate in any case. Evidence of constant reflection on practices and revision of the
curriculum was discussed during every interview. This emerged as the second theme related to this research question.

**Theme 2: Engaging in ongoing reflection and adjustment of curriculum.**

Teacher participants never communicated as if their curriculum, lessons, and classroom activities were static. In fact, all teachers across all cases expressed that they were eager to try new things with their students each year or even on a more frequent basis depending on their students’ needs. Perhaps, this was most evident during interviews with the teachers in the DMC as they were the newest of the teacher participants to implement the DBL methodology.

Keleen, the second grade teacher at SBES, was quick to reveal herself as an eager learner, looking for a new way of teaching. When asked why she was drawn to the DBL-related M.A. program, she said, “I was looking not just to get my masters, but to get a kick in the pants.” She explained that she was looking for a masters program for five years that would fulfill this desire. She added that she was “[looking for] something that I could really use, and something that would be valuable. I didn't just want to get my masters. I wanted to grow as an educator.”

Jeanette, the English teacher at GRHS was asked the same question about her motivation to try the DBL methodology in her classroom. She explained, “I found out about DBL through the teacher next door. It was very interesting to me, because I had such a tough first year as a teacher. I was like, ‘Something needs to change. Something needs to be different.’” According to Jeanette, after experiencing the methodology during a summer training session, “so many more questions popped up, and I wanted to explore, and so I decided to continue on.” Before even starting the DBL-related curriculum and
instruction M.A. program at Cal Poly, Pomona, these teachers exhibited the desire to adjust their teaching strategies in order to improve student performance at their schools.

In talking to the teachers in the DMC, it was evident that they did not feel like experts in implementing the DBL methodology, but they embraced that feeling. They showed excitement when discussing how they would change their delivery of certain activities in subsequent years as they learned more about the methodology.

The teacher participants at both DHS and WHS had more experience implementing the DBL methodology. In both of these cases, the teachers all echoed the sentiment of the DMC teachers in that they never felt like their curriculum was complete. They recognized mistakes they made and discussed the need for altering aspects of their curriculum.

The teachers at DHS were very candid about their own mistakes in their classrooms. Lindsey explained, “if they [students] can't answer the DBL question that I have at the end of my test, if they don't understand that at all, then I've done something wrong, and I have to fix it.” This level of reflection gave the impression that Lindsey does not hide her mistakes as a teacher, but learns from them and is willing to take measures to make the necessary adjustments to ensure her students learn what is needed. The other teachers shared similar accounts during the focus group interview, but then all of them related this back to their collaboration and how their ability to work with each other in designing their curriculum has allowed them to become more reflective teachers. Jonathan shared:

There's a lot higher expectations from all three subject matters, so it doesn't really allow you to, I guess, fall behind on any of them, because if
the history's wrong, then we all have to fix it. If the math isn't going well, then we need to make sure that gets fixed.

At WHS, teachers also shared accounts of their view of mistakes they have made in developing curriculum and the constant need to readjust and fix the problems. They also noted that this was an atypical behavior of teachers. Efrain supported that idea by stating, “I find that a lot of teachers say, ‘It's this year's students; they're just not quite up to par as the ones before.’ It's like, no! It's probably what I'm teaching and how I'm teaching it.” The level of honest reflection on practice, although not prompted directly in the interview questions, revealed that the eight teachers at these two schools exhibited the ability to reflect on their teaching and make necessary revisions. They see shortcomings in their classroom as theirs to fix, not their students. They stressed that the level of support they receive from their peers helped them be able to engage in such reflection.

Across all three cases, teachers expressed that reflection on classroom practice has led to many revisions in each of his or her curriculum. This was not just explained in context of a single school year, but teacher participants discussed looking ahead and considered standards reform and changing school focus as a driver of their need to revise their curriculum.

Hailey at WHS described her experience with adjusting her curriculum to fit into the Common Core state standards by stating, “I have no fear. It's easy to integrate lessons into the Common Core. The stuff in the Common Core is such a natural part of what we already do and the approach that we take.” However, this confidence was not limited to developing new curriculum or classroom activities. Ashlie at DHS shared her experience with implementation of a long existing instructional strategy at her school:
I'm a lot more comfortable leading Socratic seminars, and using a Socratic seminar, a formal one, as an assessment. Just thinking about different types of activities that can be used as assessments, as long as they have a rubric, and I have a clear way of measuring. I like to do that a lot now.

Besides current reform, Michael looked ahead to the yet-released social science content standards.

It's been interesting, I think, because with history, the state standards haven't changed yet. I feel more comfortable that when those do change, that I'll be okay. I won't have to completely rip apart everything, because so much of what those original standards are, so fact-based, and they're not as analysis- and evaluation-based, that other teachers are so used to doing notes and just facts, a lot of facts. I'm like, "No, I'm cool.” I think I'm okay with that. I've mixed it up enough.

Jonathan explained that, “each year is different. We have to create something at least slightly new each year to keep students engaged.” These teachers displayed optimism about the changing world of education and communicated that they feel comfortable with change and variety. From the interviews, it was evident that teachers felt that DBL gave them tools they felt they could apply to changing content standards or to a changing school environment.

Collaborating with other teachers and engaging in ongoing reflection and adjustment of curriculum were the two themes that were evident across all three cases of study. These were the two main factors to which the teacher participants attributed their growth in use of instructional strategies to enhance student creativity. In all three cases,
the teachers had the time and space to work together, to make mistakes, and to adjust their instruction in order to implement the DBL methodology effectively in their classrooms. This was not just an occurrence over a single school year. These teachers demonstrated their desire to adjust and improve their curriculum from one year to the next as they aimed to improve their classroom practice in response to student outcomes on various assessments measuring content knowledge and skill acquisition. The third research question was related to those assessment strategies utilized by participating teachers that measured student performance and growth related to creativity skills.

**Research Question 3: How does DBL methodology contribute to teachers’ growth in assessment strategies to promote creativity?** Teacher participants across all three cases demonstrated their own creativity through development of a novel, integrated curriculum utilizing the DBL methodology. They taught creativity skills to students by requiring them to create and build models to serve as analogies for their learning, providing space for student collaboration, and by encouraging students revise their work to reflect additional learning of content and skills. This third research question aimed to reveal assessment practices implemented by teachers that aided them in developing their students’ creativity in the classroom. Across all three cases of study, two themes emerged that supported this research question:

1. Utilizing a variety of authentic assessment strategies
2. Strategic use of physical space

**Theme 1: Utilizing a variety of authentic assessment strategies.** Across all cases, teachers discussed using authentic assessments to not only gauge students’ learning as it related to content, but also to their development of skills in a number of areas, including
creativity. The teachers described various assessments that they implemented, but the one assessment tool that all twelve participants consistently used was the criteria list.

In order to give students parameters for the objects that they design and build in order to address a problem, teachers provided them with a criteria list, which is a tool in the DBL methodology that communicates what each design needs and what students need to make sure they avoid while building models. The criteria list was the tool that was mentioned the most across all cases. It was said to be the most useful tool for assessment of creativity. All teacher participants expressed this sentiment. Seemingly restrictive, evidence suggests that the criteria list actually lends itself to the creative process.

Jonathan at DHS shared, “the criteria list gives [students] some boundaries, where [they] have to work within those confines, and still have to express themselves uniquely.”

Lindsey described the criteria list as follows:

It allows for interpretation. I might have an idea in my head of how the criteria list is going to go, and then students might start asking me questions about how they're interpreting it, and I say, “Okay, sure, I hadn't thought of that, but great, go for it. If that answers the question and what we're looking for, go [for it].”

Devin at WHS explained that the criteria list is the most useful tool for assessment of both content and skill acquisition. She said:

For me in my English classes, definitely the criteria list is going to be the best tool because I can implement a lot of the terminology that I need students to use and also hit some of the skills that they need to develop,
such as the use of figurative language or imagery or abstract thinking such as symbolism. I can include that in my criteria list.

When asked a follow-up question about utilization of rubrics for assessment, Devin added:

From the criteria list, that's where I have the rubrics, so if I ask them to have symbolism or if I ask them to have some metaphors in their description of their object then I can check off whether they did that or not, so I definitely use this as a rubric. As far as assessments, the writing and speaking becomes their assessment based on what they've made.

Interviewing the four teachers in the DMC revealed similar responses. Each teacher described the use of criteria lists as assessment tools. Their responses were similar when asked how they used the tool. They stated that it gave students boundaries to refer to while they built models of Never-Before-Seen (NBS) models to solve problems or answer course-related questions. However, a new layer of assessment was described by two of the teachers. Isabel, the fourth grade teacher explained that she was not solely responsible for assessing students’ work as her students began holding each other accountable for meeting the criteria. Second grade teacher, Keleen, explained something similar. She said, “They'll go up to the [criteria] list and say to their peers, ‘Hey, that's not NBS. I've seen that before. Why did you do that? How is that going to work?’”

Not only does the teacher use criteria lists in the DBL classroom to assess student learning, students began self-assessing and holding each other accountable for meeting the criteria. She added, “They're not going to let each other do something
they’ve seen before. If they do, they call them out. Kids actually are helping to assess the creativity as they go, on the fly, by helping peers be more accountable.” Jessica shared a similar account of how even younger students in kindergarten behave similarly when using their criteria lists, although simpler in nature, to help their peers meet the criteria. She seemed almost surprised by this seemingly atypical student outcome when she stated, “just the fact that I have 5 year olds who are in groups, helping each other solve a problem is kind of miraculous.”

Beyond the criteria lists being utilized as assessment tools, each teacher participant described their use of other authentic assessment activities. They all shared that their sole purpose was not to evaluate students solely on their learning of content as they had prior to implementing the DBL methodology. They also aimed to measure student growth in their creative skills. Speaking and writing was a major component of daily activities in the classrooms of all twelve teachers, regardless of the grade or content area taught. It was also evident that students in all of their classroom settings were constantly asked to revise their work. This was not only applicable to the models students built, but also to their writing. Michael at DHS described short films made by students to demonstrate their learning. This display of content knowledge replaced older methods such as multiple-choice tests and other previously used worksheets or other lower-level thinking assignments. Students at WHS, instead of answering questions following field trips to see plays, for example, were asked by the teacher team to instead build a model of a performance space that could be better utilized by the actors than the one they observed. Even younger students were being charged with authentic
tasks such as writing stories about their Never-Before-Seen Creatures they designed and built. “I asked my second grade students to write a story about what they did over the summer, and I didn’t get much more than a paragraph from any of them, even the super excited kid who went to LEGOLAND,” Keleen explained. “Shortly after, I had them [students] build a Never-Before-Seen creature, one of their very own. I asked them to write a story about their creature, and these seven- and eight-year old students were writing multiple pages.”

Reviewing and analyzing the three completed M.A. projects revealed data consistent with that which was described by the teachers through the interview process. In each, there were similar stories about the struggle of dealing with school and district mandates on teacher practice. Teachers were used to implementing what the rest of the school or district was implementing in terms of instruction. Working through the DBL-related M.A. program at Cal Poly, Pomona gave these teachers the tools they needed in order to implement change in their curriculum design and instructional strategies. In each of their M.A. projects, it was evident that authentic assessment took more of a role in their assessment of student outcomes than it did prior to the use of DBL methodology. They each described how they created a student-centered learning environment where student interests and current skills were incorporated into daily lessons. Model building, open-ended writing assignments, and other performance-based assessments replaced test prep, worksheets, and writing activities looking for one particular answer. It is of note, however, that this shift in practices provided challenges for the teachers as described in the M.A. projects. They similarly noted
that it was a long process with multiple missteps that often required trying different modes of assessment when students did not meet the desired learning outcomes. Speaking with each of these teachers during the interviews revealed that each still felt that there is room for revision and each seemed willing to try new activities and assessments in order to keep learning relevant for their students.

Utilizing the criteria lists as assessment tools allowed teachers to hold students accountable for meeting requirements, even if their first attempt at solving a problem was unsuccessful. Teachers would redirect students to the criteria list and encourage them to revise their work. The criteria list as an assessment tool also led to students providing feedback to each other about their work. Teachers recognized the usefulness of these tasks and moved toward including more authentic assessments in their classrooms, including multiple writing activities and use of technology so students could produce artifacts of learning that encouraged their creativity and kept learning relevant to their experiences.

The second theme that emerged from data collection that helped answer the third research question is related to display of those authentic learning products created by students. Each of the 12 teachers held the practice of strategically using the physical learning space in their classrooms in order to display student work. This commonality emerged through the interviews conducted within each case of study, but it was perhaps most noteworthy through
the direct observation of the learning space at DHS and WHS and through analysis of photographic evidence documented by the teachers in the DMC.

**Theme 2: Strategic use of physical space.** Efrain at WHS described their teachers’ intent to create a student-centered classroom. He said that, “[it] lends itself to shared ownership of not only the physical space, but also of the learning experience.” The classrooms of teachers were observed in both DHS and WHS in order to document how the classroom space was used by these teachers to develop a student-centered classroom. The same goal was applied to analyzing photographs of classroom space utilized by the DMC teachers. These photographs were provided in documentations of classroom practice written by the teachers in the DMC.

Walking through the four connected classrooms of the teachers at DHS revealed creative use of the classroom space. A main component of the DBL methodology is for teachers to challenge students to build multiple models throughout the school year to demonstrate how they would solve various problems. A city model is built to serve as a year-long context for their learning. This city model was on display in one of the four teachers’ classrooms. Each teacher did not have a separate city because they shared students who participated in this model building. So, even if the students would not necessarily see the model during every class, they would see it and interact with it every day. On this city model were smaller models built by the students. Sometimes, multiple iterations of each model were displayed to remind students of their revisions they made.

Classroom space was not just taken up by the city model. Across all of the walls, cabinets, and shelves in all four classrooms were examples of student work. The criteria lists that were used during each design challenge were displayed, even if they were ones
used months prior to this observation. Student writing was also displayed all over the four rooms, sometimes multiple drafts of the same writing were evident. Other models and authentic student work samples took their place in the classroom where pre-packaged posters or nothing at all would be observed in some of the non-DBL classrooms at the school, as explained by the teachers. When asked about the purpose of displaying and leaving so many student work samples in the classroom for such a long time, it was shared that the purpose was for review. Teachers explained that students were able to see their work in the classroom all year long and those work samples would help students remember what they did and why they did it. Student work helped to tell the story of the classroom, but not just of the room itself but of the diverse group of young people who contributed to the walls, cabinets, and shelves full of materials.

This same type of classroom space, albeit a smaller space, was observed at WHS. Since teachers taught students in a single classroom, the integrated curriculum they designed was even more evident. There were no separate spaces that would trigger one to guess what subject was taught in each room, but in a single space, student work relating to math, science, social science, and English could all be observed. It was explained that some of the work displayed actually fulfilled requirements of multiple courses at once, such as English and science, so it couldn’t be discerned as evidence of student learning in just one of the classes. This classroom at WHS also had a landsite model, similar to the much larger city model at DHS. Other models were housed on top of this landsite built by students, most of which were not glued down. It gave the indication that this model was flexible and teachers explained that things could be moved or replaced depending on
what the curriculum called for. Other student work was also displayed on the walls and countertops.

Although there was not more work on display here than at DHS, it looked a lot busier. Although the intent was the same at both school sites, there was more organized display of student work at DHS. It is of note that it was not as clear at WHS what all of the models were meant to represent as only the most current criteria list was on display. The presence of all criteria lists at DHS made it clear to a visitor exactly what students were doing in those classes. Since teachers at both sites shared that the criteria list was their most useful assessment tool, it is more logical to see them all displayed in the classroom space rather than just one at a time.

An important thing that the two directly observed school sites had in common was the placement of the furniture in the classroom. Student desks and chairs could be moved in a manner that would allow for students to sit in closer proximity to each other for sake of collaboration and planning solutions to problems. This also allowed for presentation space to be maximized when needed.

It was admittedly more difficult to analyze the classroom space of the four teachers in the DMC through photographic evidence. This was not the ideal method for observation, but visits to the schools sites were not possible. However, even with this challenge, some similarities to both DHS and WHS could be seen. Each of the other classrooms had a city model displayed in the room that served as a holder for other models. In addition, student writing samples were seen on display. There was also evidence of a variety of building materials present that students could use to create models. These building materials were also present in the other two school sites already
analyzed. It was not possible to discern the uniqueness of each of these classroom environments without direct observation as was done at DHS and WHS. However, the commonalities that did present themselves were:

- Display of a city or landsite model in a prominent location in the room
- Display of student writing samples and other models
- Flexible furniture placement that could maximize the space or change it for various purposes.

Utilizing a variety of authentic assessment strategies and the strategic use of physical space in the classroom, especially to display student outcomes from those assessments, were the two themes that emerged related to the third research question. These practices contributed to teachers' growth in assessment strategies that promoted creativity. This was true across all three cases of study, regardless of grade level or subject taught by the teachers. Where the school sites differed, such as amount of space, specific topics taught, or the number of teachers implementing the DBL curriculum, these two commonalities emerged.

**Summary**

This chapter provided a summary of data collected in relation to the three research questions that guided the study:

1. How does DBL methodology contribute to students' growth in skill areas related to creativity?
2. How does DBL methodology contribute to teachers’ growth in use of instructional strategies to enhance creativity?
3. How does DBL methodology contribute to teachers' growth in assessment strategies to promote creativity?

In order to arrive at answers to these questions, two focus group interviews, comprised of four teacher participants each, were conducted at two separate school sites. In addition, four teachers who collaborated as part of a DBL-related M.A. cohort group were individually interviewed. Other data were collected through observation of the physical classroom space of these teachers, either directly or through photographs that were part of documentation of classroom practice. Finally, archival data in the form of three completed DBL-themed M.A. projects were analyzed.

The data were analyzed and coded in order to discern patterns across each of the cases of study. Each research question was answered by themes that emerged related to each research question. These themes were evident across all three cases of study; Darwin High School (DHS), Wolf High School (WHS), and the DBL Masters Cohort (DMC). Chapter 5 will present conclusions drawn from analyzing these themes, a discussion of the implications of this research, and recommendations for future research related to the topic of this study.
CHAPTER 5: CONCLUSIONS, DISCUSSION, AND RECOMMENDATIONS

The purpose of this study was to determine how DBL methodology contributes to students’ growth in skill areas related to creativity and how it contributes to teachers’ growth in use of instructional and creative strategies to promote creativity. A multicase study was conducted within the context of three cases. Data collection methods included focus group interviews, one-on-one interviews, field notes, observation of physical classroom spaces, and analysis of archival data.

In order to focus data collection strategies, three research questions were developed:

1. How does DBL methodology contribute to students' growth in skill areas related to creativity?
2. How does DBL methodology contribute to teachers' growth in use of instructional strategies to enhance creativity?
3. How does DBL methodology contribute to teachers' growth in assessment strategies to promote creativity?

In order to address the research questions, the collected data were analyzed. Recorded interviews were transcribed and coded. Seven themes emerged from the data; three were associated with research question number one and two each were associated with research question number two. This chapter will provide conclusions from the data analysis, discuss implications of the emergent themes, and offer recommendations for future research related to the topic of this study. Table 5.1 contains a summary of the emergent themes as each related to the three research questions guiding this study.
Table 5.1

Summary of Emergent Themes as They Relate to the Research Questions

<table>
<thead>
<tr>
<th>Research Questions</th>
<th>Emergent Themes</th>
</tr>
</thead>
<tbody>
<tr>
<td>How does DBL methodology contribute to students' growth in skill areas related to</td>
<td>• Through developing presentation skills</td>
</tr>
<tr>
<td>creativity?</td>
<td>• Through planning, executing, and revising work</td>
</tr>
<tr>
<td></td>
<td>• Through building meaningful relationships with peers</td>
</tr>
<tr>
<td>How does DBL methodology contribute to teachers' growth in use of instructional</td>
<td>• By collaborating with other teachers</td>
</tr>
<tr>
<td>strategies to enhance creativity?</td>
<td>• By engaging in ongoing reflection and adjustment of curriculum</td>
</tr>
<tr>
<td></td>
<td>• By utilizing a variety of authentic assessment strategies</td>
</tr>
<tr>
<td></td>
<td>• Through strategic use of physical space</td>
</tr>
<tr>
<td>How does DBL methodology contribute to teachers' growth in assessment strategies</td>
<td></td>
</tr>
<tr>
<td>to promote creativity?</td>
<td></td>
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<td></td>
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</tbody>
</table>

Conclusions

In order for the DBL methodology to work as a tool for teaching and assessing creativity, teachers must design instructional activities that develop the skills and attitudes necessary for students to be creative risk takers, they must create a physical space for those skills and attitudes to flourish, and they must use authentic assessment tools to measure student growth in creativity. From the themes that emerged from this study, six conclusions relating to implementation of the DBL methodology to teach and assess creativity were drawn. The first four conclusions relate to skills and attitudes that teachers must help develop in students in order to foster creativity. The fifth conclusion
refers to the learning space in which the development and growth in those skill areas take place. Finally, the sixth conclusion relates to assessment practices utilized by the participating teachers. From analysis of the findings from this study, it was concluded that creativity thrives when a teacher utilizes tools of DBL methodology to encourage their students to:

1. build confidence in themselves, their abilities, and their work.
2. take ownership over their learning and unique problem-solving strategies.
3. develop resiliency by making revisions to work when mistakes are made.
4. demonstrate engagement in the full learning experience.
5. collaborate with the teacher to design a creative learning space.
6. use criteria lists as an authentic assessment tool to self- and peer-assess.

These conclusions will be discussed in three parts. First, in order to achieve the desired learning results associated with the P21 creativity standards; teachers must develop students’ attitudes and behaviors that allow for creativity. The attitudes of creativity associated with this study include the first four conclusions and will be referred to collectively by the acronym, CORE. This will be explained in the next section. Second, teachers must develop a creative learning environment. Lastly, teachers must develop authentic assessments to measure their students’ learning.

**Discussion**

This section will provide an explanation of the conclusions drawn from the analysis of data. Pertinent literature is used to substantiate the conclusions and give a context for the development of recommendations for future research. Conclusions were drawn from themes that emerged across all three cases included in this study.
Collectively, the three cases of study represent six different schools. Teacher participants in this study come from three high schools and three elementary schools. In terms of the high school teacher participants, they represent all of the core content areas; English, mathematics, social science, and science. In addition, two of the high schools were traditional, comprehensive high schools, while the third was an alternative high school. The three elementary school teachers were a kindergarten, second grade, and fourth grade teacher. The commonality between these school settings was that the teachers fully implemented the DBL methodology in their classrooms. Regardless of the school setting, the grade level taught, the core content area taught, or whether the school was considered traditional or alternative in setting, the conclusions drawn from this research apply to all of the school settings that were studied. Davies et al. (2014) explain, “there is reasonable evidence that bringing more ‘playful’ or ‘games-based’ approaches into classrooms at all ages can support the development of creative skills” (p. 86).

**Developing a Students’ CORE**

In order to promote creativity in the classroom a teacher utilizing the DBL methodology must develop students’ attitudes related to creativity, which will be referred to as the CORE. This acronym, coined from analysis of themes that emerged from this study, refers to the necessity for teachers to facilitate the growth in a student’s confidence, ownership, resiliency, and engagement (CORE) in order to encourage creative thought. Table 5.2 displays an organization of the creativity skills as described in the P21 Framework for 21st Century Learning as they relate to the CORE attributes.
Table 5.2

*Creativity and Innovation Skills for 21st Century Learning Organized by Attitudes of Creativity*

<table>
<thead>
<tr>
<th>Confidence</th>
<th>Ownership</th>
<th>Resiliency</th>
<th>Engagement</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Develop, implement and communicate new ideas to others effectively</td>
<td>• Demonstrate originality and inventiveness in work and understand the real world limits to adopting new ideas</td>
<td>• Elaborate, refine, analyze and evaluate their own ideas in order to improve and maximize creative efforts</td>
<td>• Use a wide range of idea creation techniques (such as brainstorming)</td>
</tr>
<tr>
<td>• Act on creative ideas to make a tangible and useful contribution to the field in which the innovation will occur</td>
<td>• Create new and worthwhile ideas (both incremental and radical concepts)</td>
<td>• View failure as an opportunity to learn; understand that creativity and innovation is a long-term, cyclical process of small successes and frequent mistakes</td>
<td>• Be open and responsive to new and diverse perspectives; incorporate group input and feedback into the work</td>
</tr>
</tbody>
</table>

Table 5.2 was adapted from the P21 Framework for 21st Century Learning document (http://www.p21.org/our-work/p21-framework).

**Confidence.** The teachers who participated in this study described multiple instances of their students displaying growth in their presentation skills. Students who exhibited fear of speaking in front of an audience prior to learning content through DBL methodology surprised teachers with the amount they had to say when encouraged to do so. Some of these were special needs students and students with language deficiencies. Additionally, with the DBL methodology, teachers constantly ask students to try things that are new and Never-Before-Seen (NBS). Participating teachers explained that students expressed a willingness to engage in these playful learning activities. These
observations lent themselves to the idea that through the DBL methodology, teachers were fostering students’ confidence.

In their book, Creative Confidence: Unleashing the Creative Potential Within Us All, Kelley and Kelley (2013) describe a term they refer to as creative confidence. They capture the essence of the relationship between confidence and creativity when they explain:

When people transcend the fears that block their creativity, all sorts of new possibilities emerge. Instead of being paralyzed by the prospect of failure, they see every experience as an opportunity they can learn from… With creative confidence, they become comfortable with uncertainty and are able to leap into action. Instead of resigning themselves to the status quo, or what others have told them to do, they are freed to speak their mind and challenge existing ways of doing things. They act with greater courage, and have more persistence in tackling obstacles. (p. 10)

Doreen Nelson, creator of the Design-Based Learning (DBL) methodology, described in her book, City Building Education: A Way to Learn, an observation of the growth in student confidence as a result of building models to demonstrate their learning. Nelson wrote:

They [students] develop what Jerome Bruner calls courage of taste, that is, a confidence in one’s own intuitions about what is good, what is beautiful, what is moving, and what is tawdry. It is this inner confidence that guides students not only in planning their community of the future but also in
deciding what career path to follow, what to do with their time, and how to live their lives. (Nelson, 1982, p. 14)

Participants in this study explained the growth shown by students in terms of their confidence in this regard. They began to self-assess and provide feedback to peers. Teachers also shared that their students were taking their practices beyond the classroom and were applying them to other situations. Student attitudes of confidence were nurtured by the teachers who exhibited confidence in their in their delivery of content through utilization of the DBL methodology.

**Ownership.** Ownership in the DBL classroom can be observed when students create something individual, unique, novel, and innovative and be able to defend that creation. These were all terms that teacher participants used to describe their students’ work and classroom performance. Ownership is also evident in the collaborative planning process that takes place. Conley and French (2014) address ownership by explaining that it has goal setting and self-guidance as components.

According to Conley and French (2014), “central to student ownership of learning are high aspirations and goals clearly aligned to achieve them” (p. 1030). Additionally, student self-regulation demonstrates their ownership of their learning. Participants in this study explained that students often self-assess and offer their peers feedback on their work. The teachers step back and act as facilitators rather than those who have all of the answers. They share the process of decision-making in the classroom with their students, encouraging them to work together to solve problems. Enghag and Niedderer (2008) explain, “balancing the relationships of power and authority, creating spaces for everyone to contribute and to advocate students to be resources for one other are the core of a
framework to understand ownership” (p. 631). During this study, the data revealed that students participating in activities related to the DBL methodology are eventually, with coaching, more willing to ask their peers for assistance rather than the teacher when they encounter a problem. They also communicated effectively with each other and with the teachers, posing questions to gather needed information in the decision-making process. In this manner, that these students were developing ownership.

The component of ownership that perhaps came up most during participant interviews was the ability to make choices. Especially in terms of an established system of governance in the classroom, students take on roles that allow them to be decision-makers (Nelson, 1984). This leads to a decentralized, or a student-centered classroom. Student-centered classrooms are environments that encourage students to take ownership of their own learning. When there is shared ownership of the learning experience between teacher and student, increased positive outcomes for the learner are possible (Enghag & Niedderer, 2008; Lord et al., 2012).

**Resiliency.** Resiliency is related to the ability to “view failure as an opportunity to learn; understand that creativity and innovation is a long-term, cyclical process of small successes and frequent mistakes” (Partnership for 21st Century Learning, 2015). In the cognitive domain, it also refers to the ability to be able to refine solutions to problems, constantly elaborating and improving understanding. In the affective domain, the ability to navigate challenges and hardships in order to succeed is a defining characteristic of resilience. These attributes in students were evidenced by responses from teacher participants in this study. They shared their experience of observing multiple students
developing the skill of learning from their mistakes in order to revise their work and deepen their learning of particular concepts.

Perhaps the most compelling stories shared by the teachers in this study related to the growth of their special needs and English learner students. Downey (2008) offered an explanation that relates the resiliency displayed by these students to the type of activities associated with the DBL methodology. She stated, “at-risk students tend to experience educational resilience when they have opportunities to develop skills in communicating, coping with stress, managing conflict, problem solving, decision making, and critical thinking” (61). These components are all cornerstones in the DBL methodology. As teachers guide students to design and build a simulated city, problems arise that require students to take the lead in solving. However, it is not an individual process, but one that requires a diverse group of students to work together in a collaborative nature, in a setting that fosters such work, in order to make decisions about how to best approach and solve the problems of their simulated world (Nelson, 1974, 1982, 1984). These classroom activities and instructional strategies contribute to building student resiliency in learners that enter a classroom possessing a variety of levels of existing competencies.

**Engagement.** Students who engage in their learning participate in activities, collaborate with their peers, and exhibit a desire to learn from and interact with the various components of the classroom environment (Reyes, Brackett, Rivers, White, & Salovey, 2012). In their model of motivation and engagement, Conley and French (2014) state, “engagement factors […] involve students’ ability to see the value in coursework, motivate to excel, see the value of learning, and enjoy a challenge” (p. 1022). The
participating teachers in this study shared accounts of where these factors were evident in their students during various learning activities.

Beghetto (2013), in his study of factors relating to creative self-efficacy in middle and high school students, discussed student motivation in terms of their goals for attaining mastery of particular concepts or skills. He also described student outcomes associated with motivation that include “high levels of effort and engagement, use of adaptive learning strategies, enjoyment of and intrinsic interest in learning, challenge seeking, intellectual risk taking, and persevering in the face of difficulty” (p. 448). His observation provides a link between student engagement and attributes of confidence, ownership, and resiliency. The link between engagement and ownership is further supported by the idea that those who have ownership over their learning tend to actively engage in the classroom in a more authentic manner (O’Neill, 2010).

The DBL methodology provided participating teachers in this study with tools to encourage authentic engagement in their classrooms. Their observations revealed that students were engaging in their whole school experience by taking their learning outside of a particular classroom environment and applying it to other various classroom and extra curricular settings. Nelson (1984) explained that this teaching methodology lends itself to transfer of learning and encourages the application of learning. She (1984) argued that DBL methodology “allows teachers to interconnect subjects as they are in real life without the constraints of artificial boundaries” (p. vii). This practice was also evident in the manner in which the participating teachers in two of the cases in this study engaged in collaboration with their peers in order to develop an integrated curriculum that tied together concepts from each teacher’s content area. This work was aided, and
student outcomes were fostered, through the careful design of the physical space in the classroom.

**Creative Learning Environment**

Davies et al. (2014) argue:

Teachers indeed have an important role to play in the development of creative learning environments to foster the creativity of learners. They can do this through building positive relationships, modeling creative behavior, longer-term curriculum planning, striking a balance between freedom and structure, allowing flexible use of space, understanding learners’ needs and learning styles, creating opportunities for peer collaboration and assessment, and effective use of resources. For this to happen, teachers need to have a positive attitude towards creativity and feel confident about their own skills base. (p. 39)

These habits of teachers who teach for creativity are directly related to how they utilize the physical space in their classroom in addition to how they use their behaviors to encourage creativity in their students. These components of a positive, creative learning environment were evident across all three cases in this study.

Considering the creative learning environment is very much a constructivist approach to instruction (Khalid & Azeem, 2012). The teacher must be able to share ownership of the classroom if they wish to encourage students making decisions that affect their learning and learning space (O’Neil, 2010). Davies et al. (2014) contends that “there is evidence that suggests an impact of creative learning environments on learners’ academic achievement; increased confidence and resilience; enhanced motivation and
engagement; development of social, emotional and thinking skills; and improved school attendance” (p. 88). In other words, in the right environment, a student’s confidence, ownership, resiliency, and engagement will develop and flourish with guidance from the teacher.

The Criteria List as an Authentic Assessment Tool

In order for students to gain a deep understanding of what they are learning, they must be engaged in activities and assessments that are relevant to their lives. This is a central characteristic of authentic assessments (Frey et al., 2012). In order for meaningful learning experiences and assessments to be implemented, teachers must be willing to share ownership of the classroom with students. Kearney (2013) argues:

Control needs to be relinquished by the ‘guardians of knowledge’ to allow authentic learning to occur. Situations whereby knowledge is attained through collaboration and mutual understanding of expectations and outcomes is a more desirable goal and can be accomplished in many ways, two of which are through self- and peer-assessment. (p. 878)

Across all three cases, teacher participants stressed the use of criteria lists as their central assessment tool for encouraging students to self- and peer-assess learning in the classroom. Criteria lists are used mainly to provide structure and restraints when students create and build models to serve as solutions to problems posed by the teacher.

According to Nelson (2006), criteria lists are developed by the teacher to:

- guide and organize students’ work,
- set standards by which students are to evaluate their work,
- and serve as a means of grading student achievement.
In their article, “Assessing Creativity in the Classroom”, Barbot et al. (2011) state, “A common way to assess creative potential involves the achievement of a creative product based on initial elements or constraints” (p. 127). In a classroom where teachers implement DBL methodology, students use criteria lists as a way to make sure they have successfully solved a problem. Students also hold each other accountable during presentations of learning by utilizing criteria lists. Nhem (2015) explains, “Students in a DBL classroom discuss and explain what they are building and why they are building it in order to justify their solutions against the set criteria on their criteria list” (p. 36). It is in this nature that the participating teachers focused on the use of criteria lists to assess student growth in relation to creativity in an authentic manner. In addition, criteria lists are not just utilized for providing building constraints during model construction, but also for student presentations and writing. According to Krathwohl (2002), all of these types of activities fit the ‘create’ level of Bloom’s revised Taxonomy as in each case, students are “putting elements together to form a novel, coherent whole or make an original product” (p. 215). According to the participating teachers in this study, criteria lists were used consistently throughout the school year to measure student achievement in terms of creativity.

The six conclusions drawn from the themes that emerged through analysis of the data were applicable to all three cases of study. Teachers utilized the DBL methodology to develop activities that allowed them to attend to their students’ CORE, encouraging student growth in areas of confidence, ownership, resiliency, and engagement. Teachers strategically utilized their classroom environment to facilitate this work. Finally, teachers were able to measure student growth in these behaviors or attitudes associated with
creativity through authentic assessment techniques, most notably, through the use of criteria lists.

**Recommendations for Trainers of the DBL Methodology**

This study revealed that teachers who implement the DBL methodology feel that they have effective tools for teaching and assessing creativity in the classroom. They developed various authentic assessment tools related to students’ model building activities that have shown measurement in the growth of student creativity skills; however, there is not much documented evidence of the use of these assessment tools.

A requirement of teachers who complete the Master of Arts program in Education with a focus on DBL methodology at Cal Poly, Pomona is to develop a written project documenting the teacher’s experience with the implementation of the method. The projects must include a chapter about the findings and student outcomes of such implementation. Existing projects show student performance through inclusion of assessment data from past California State Tests (CST’s) and California High School Exit Examinations (CAHSEE). These examinations are no longer in existence. There is also data included displaying student performance on common benchmark examinations developed by a school’s content-specific departments, school districts, or outside agencies. However, these types of assessments do not measure students’ growth in creativity or other skills required of them by the Common Core state standards.

It is recommended that future M.A. projects that are developed by candidates in this particular Master of Arts program intentionally include student data on teacher-created, authentic assessments that are developed to measure student growth in pertinent skill areas. It would be the responsibility of the instructors in this program to facilitate the
work necessary for teachers to develop the assessments, rubrics, and intended measures of student success that would be able to communicate student outcomes related to teacher-identified skills.

**Recommendations for Further Research**

This study was focused on three cases of study that, combined, included a total of twelve teacher participants. Although the data led to a rich account of how these teachers implemented the DBL methodology to teach and assess creativity in their respective classroom settings, it proved to be limited in relation to the scope of DBL methodology implementation across all schools where teachers employ the method as their key strategy of curriculum design and delivery. In addition, DBL is just one method for encouraging student creativity in K-12 classrooms and the results of this study can only be extrapolated in theory to other scenarios and contexts of which DBL is not a part.

In order to address these realities that any one study may be perceived as limited in its application to multiple contexts, considerations were made for possible future research that could possibly fill potential gaps between theory and application. Recommendations for future research topics are presented below with a brief explanation.

- The experience of first-year candidates in the university Master of Arts program in Education with a focus on Design-Based Learning methodology at Cal Poly, Pomona with implementing related strategies in their classrooms.

The case for this study referred to as the DBL Masters Cohort (DMC) provided thoughtful insight into their experience with implementing the DBL methodology. However, their interview responses and researcher observations of the physical space in their classrooms provided a snapshot of that journey. A study focused on these teachers’
growth from the beginning of enrollment in the program through the end of their first year would address the steps they took to develop a year-long, integrated curriculum based on the DBL methodology, their learning from mistakes and setbacks, and the level of ongoing support they required from the university and their school sites in order to be successfully complete the requirements of the first year of the program.

- How teachers of the DBL methodology develop classroom governance systems to support student learning in the affective domain in order to encourage informed decision-making.

A conclusion of this study was that the DBL methodology provides instructional tools for developing students’ learning in the affective domain. A closer look at this concept may provide insight regarding student decision-making practices. In hopes of developing concerned citizens capable of working together to make positive differences in the world beyond the high school environment, it is imperative that educators consider student formulation of values and beliefs and how to facilitate students building those attributes.

- Design-Based Learning methodology as a means for encouraging the process of revision.

A major takeaway from this study was the concept that revision is necessary for students’ learning about a subject to deepen. Usually, student learning is assigned a timeline, just by the very nature of education. Students have limited time to demonstrate mastery of discrete topics related to content. However, when their final product of learning, whether a project, worksheet, or exam, is submitted by a set deadline, they are evaluated and their mistakes may be pointed out as they receive their final grade, but they are not given any opportunities for revision. A key component of the DBL methodology is the process of
revision. A closer look at how teachers who utilize the DBL methodology encourage revision, specifically, would be warranted in order to learn of particular habits of both teacher and student as they relate to the revision process.

- Design-Based Learning methodology implementation in alternative education settings and its impact on student growth in resiliency.

Participants in this study stressed that failure or a mistake was not a justification for a student to quit the learning process. Instead, they taught their students to use feedback, both from the teacher and their peers, as information they could use to revise their work, and thus their learning about a particular topic or subject. In this regard, across all three cases in this study, teachers shared that their implementation of the DBL methodology led to growth in their struggling learners. A study of this methodology’s implementation in an educational setting comprised of almost all struggling learners, such as in an alternative or continuation high school where many students are reclaiming credits for previously failed courses, may provide more specific data regarding the strategies used through implementation of DBL methodology that improve learning outcomes for those students.

- Teachers’ perception of their confidence in implementing innovative instructional activities related to the level of support of school leaders.

The teacher participants in this study shared that although their principals or other school site leaders were not particularly knowledgeable of the DBL methodology; they still offered support to the teachers practicing the method in their classrooms. A study looking at the relationship between leadership style and perceived support teachers feel in implementing the DBL methodology would shed light on principal leadership qualities.
that encourage teachers to utilize the DBL methodology. This could even be taken out of
the context of the DBL methodology and be applied to any new or innovative program
implementation at a school site.

- Comparison of teacher selective collaboration and forced teacher collaboration
  and the impact each has on teacher motivation.

Collaboration among teachers was a theme that emerged in relationship to research
question number two in this study. It was revealed that teachers in the study selected to
be a part of the collaboration that occurred in order to develop a curriculum based on the
DBL methodology. Comparing this type of collaboration to that which is forced on
teacher groups may reveal positive collaboration practices that could have more
widespread application beyond the realm of the DBL methodology related to teacher
motivation.

- The relationship between teachers’ strategies of encouragement and student
growth in creative activities and willingness to take risks.

Teacher participants in this study explained that they gave students constant feedback on
their work. In addition, multiple examples indicating that initial non-participating
students eventually became integrated into the classroom community and sometimes,
they became leaders. This study must avoid generalizing these outcomes other contexts
outside of the cases of study, however, it may be of great importance to identify specific
strategies that teachers who implement the DBL methodology use in order to encourage
and nurture such growth. Perhaps, then, those strategies could be studied in various
contexts in order to inform the practice of encouragement, especially for struggling and
historically underserved populations of students.
Concluding Thoughts

This study aimed to determine how teachers utilized Design-Based Learning methodology to teach and assess creativity. Teacher practice was analyzed through interviews, document review, and direct observation of the physical classroom space. It was revealed that the participating teachers were able to use the DBL methodology to cultivate behaviors and attitudes in their students that made it possible for them to demonstrate their learning through various creative devices. These attitudes related to creativity; confidence, ownership, resiliency, and engagement, were not just expressed by students in the classrooms of teachers implementing DBL methodology, but they showed evidence of transferring those characteristics outside of the classroom.

According to the participating teachers, the DBL methodology allowed them to develop a curriculum that aided them in teaching Common Core standards as well as creativity skills as outlined in the P21 Framework for 21st Century Learning as described in Appendix A. This methodology also stresses the use of authentic assessment strategies, most notably, the utilization of criteria lists to guide student learning. Teachers were not solely responsible for using criteria lists for assessment. Students used them to self-assess and track their progress through classroom activities. Students also used the criteria lists to assess their peers. Davies et al. (2014) contend:

There is strong evidence from across the curriculum and age-range that where children and young people are given some control over their learning and supported to take risks with the right balance between structure and freedom, their creativity is enhanced. (p. 85)
Teachers need to allow the space for students to be creative. Part of that is moving from a teacher-centered classroom environment to one that is student-centered. This is a central component of the DBL methodology.

Studying the use of the DBL methodology is pertinent to current educational reform. In a time when many teachers question how to develop students’ skill sets in addition to increasing their content knowledge, this study presented one manner in which thoughtful curriculum design and implementation through instruction has shown student gains in both the cognitive and affective domain.

The teachers who participated in this study believe that any and all of their students can move toward success not only related to learning the content that is taught, but to know what to do with that knowledge in order to make an impact on their communities. The teachers were creative in their curriculum design and were reflective when something did not go as planned and revised their lessons as needed. Davies et al. (2014) explain, “Flexible approaches to curriculum and lesson structure; particular types of classroom interaction with pupils, together with the use of…assessment, are important components of teaching for creativity” (p. 88). The flexibility of the teachers in this study was evident as was the positive student outcomes that their flexibility enhanced.

It is not enough for a teacher to merely transfer knowledge of topics, concepts, or things to students in order to make them concerned citizens in this world. Instead, it is perhaps a teacher’s most crucial duty to develop learners who appreciate the unique thoughts, beliefs, and values of diverse groups of people in order to empower them to become the important decision makers of this world.
References


*Design as a catalyst for learning*. Alexandria, VA.: Association for Supervision and Curriculum Development.


based, experiential, and inquiry-based teaching. *Educational Psychologist, 41*(2), 75-86.


Laitsch, D. (2007) Design-Based Learning and Student Achievement; Research Brief, Vol 5, No. 6, ASCD.


## Appendix A

### Creativity and Innovation Skills for 21st Century Learning

<table>
<thead>
<tr>
<th>Think Creatively</th>
<th>Work Creatively with Others</th>
<th>Implement Innovations</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Use a wide range of idea creation techniques (such as brainstorming)</td>
<td>• Develop, implement and communicate new ideas to others effectively</td>
<td>1. Act on creative ideas to make a tangible and useful contribution to the field in which the innovation will occur</td>
</tr>
<tr>
<td>• Create new and worthwhile ideas (both incremental and radical concepts)</td>
<td>• Be open and responsive to new and diverse perspectives; incorporate group input and feedback into the work</td>
<td></td>
</tr>
<tr>
<td>• Elaborate, refine, analyze and evaluate their own ideas in order to improve and maximize creative efforts</td>
<td>• Demonstrate originality and inventiveness in work and understand the real world limits to adopting new ideas</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• View failure as an opportunity to learn; understand that creativity and innovation is a long-term, cyclical process of small successes and frequent mistakes</td>
<td></td>
</tr>
</tbody>
</table>

*The above figure was adapted from the P21 Framework for 21st Century Learning document (http://www.p21.org/our-work/p21-framework)*
Appendix B

Interview Questions for Teacher Participants

1. Which DBL tools do you find most effective in eliciting creativity from your students. Why?

2. Are there any DBL tools that you no longer utilize or that you utilize less? Why?

3. How does DBL help you develop assessments and rubrics for your students?

4. How do you incorporate the P21 Framework for 21st Century Learning into your lesson plans? Do you specifically use the document and language in the document during planning or revision of assessments?

5. How does DBL help you teach resiliency skills?

6. How do key principles of the DBL methodology allow you to be creative in your curriculum design while meeting CCSS?

7. Do your student presentation skills differ from those of non-DBL students or from your students prior to your participation in DBL? If so, how?

8. Have students ever made suggestions as to how they demonstrate their learning of concepts different than what you have planned? If so, how?

9. How has DBL facilitated collaboration in your program?

10. Is there anything you would like to add specifically about how you plan to teach and assess the creativity standards?
Appendix C

Institutional Consent Form

Principle/Superintendent
address

Dear Administrator,

I am writing this letter to request permission to collect data for my doctoral dissertation entitled, Using Design-Based Learning Methodology as a Tool for Teaching and Assessing Creativity in the Classroom, within the School District. In order to maintain the confidentiality of the participants and of the school district, pseudonyms will be used in place of participants’ names and the school district’s name.

The purpose of my study is to describe how the tools and principles of the Design-Based Learning (DBL) instructional methodology are used to teach and assess creativity as described in the P21 Framework for 21st Century Learning document and as it aligns to this district’s mission.

I am seeking permission to conduct classroom observations and focus group interviews with teachers utilizing DBL in their classrooms and with parents of students participating in DBL classrooms. In addition, teachers will be asked to provide student work samples and rubrics in order to show intentional teaching and assessment of creativity in the classroom. Classroom visits will take place during an agreed upon time between teachers, myself as the researcher, and site administration. Interviews will take place after contract hours at teachers’ school sites or at a pre-arranged and agreed upon location. Participants’ identities will be confidential and participation will be voluntary. Interviews will last no longer than 45 minutes. Interviews will be audio recorded, with permission of the participants, to be transcribed later during the data analysis process. Each participant will receive an information sheet and an informed consent form to sign prior to the start of every interview. Participants will be notified of their right to end participation at any time during this study.

A copy of the final dissertation will be provided to you upon request. Please indicate that you are giving me permission to conduct my study within your school district.

Sincerely,

Richard Rosa

Principle/Superintendent
Appendix D

Participant Consent Form

California State Polytechnic University, Pomona
Informed Consent for Research Involving Human Subjects

INFORMED CONSENT

You are being invited to participate in a research study, which the Cal Poly Pomona Institutional Review Board (IRB) has reviewed and approved for conduct by the investigators named here. This form is designed to provide you - as a human subject - with information about this study. The investigator or his/her representative will describe this study to you and answer any of your questions. If you have any questions or complaints about the informed consent process of this research study or your rights as a subject, please contact the Compliance Office within Cal Poly Pomona’s Office of Research at (909) 869-4215.

This document explains your rights as a research subject. If you have questions regarding your participation in this research study, please contact the investigators using the information below.

Using Design-Based Learning Methodology as a Tool for Teaching and Assessing Creativity in the Classroom

Primary Investigator: Richard Rosa
Faculty Advisor: Dr. Betty Alford
IRB protocol # IRB-16-68

You are invited to participate in a research study regarding use of Design-Based Learning (DBL) tools and principles as a means of curriculum development in order to teach and assess creativity skills. This form provides you with information about the study. The study has been approved for ethical conduct by the California State Polytechnic University, Pomona Institutional Review Board (IRB) on ethical research practices and by the Superintendent of this school district.

Richard Rosa is conducting the study for a dissertation, supervised by Dr. Betty Alford, California State Polytechnic University, Pomona. Mr. Rosa will describe the study and answer any questions about the study and your rights as a research participant. If you have additional questions, you can contact the researchers using the information below. Your identity will remain confidential and will not appear in any materials related to this study. The focus group interviews in which you are being invited to participate will be audio recorded. Only the researchers listed below will have access to these recordings. The audio files will be transcribed by the principal researcher of this study. Please know that your participation in this focus group is completely voluntary and you may end your participation at any time. The primary researcher, or any other party, will not receive any financial benefit or compensation from conducting this study. There is also no financial reward being offered to participants. Your participation in the focus group interview process is completely voluntary. The focus group interview will last no more than 45 minutes. During this time, you will be asked questions regarding your implementation of Design-Based Learning tools and strategies in teaching and assessing creativity.

If you have any questions about research participants’ rights, complaints about the informed consent process of this research study, or feel your participation poses any sort of risk to yourself personally or professionally, please contact the Compliance Office within California State Polytechnic University, Pomona’s Office of Research at (909) 869-4215. Information is also available at the IRB website, www.csupomona.edu/research/irb.

If you have any questions about the district’s approval of the study, please contact the superintendent of schools.

Thank you for your voluntary participation in this study.
Agreement to Participate in Research Study (Informed Consent)
California State Polytechnic University, Pomona IRB Protocol

Consent: I consent to participate in a focus group interview for the study:
Using Design-Based Learning Methodology as a Tool for Teaching and Assessing Creativity in the Classroom

(sign below)

I also consent to audio recording during the focus group interview for data analysis purposes.

I understand that my participation in this study is entirely voluntary and that I may decline to answer or withdraw from the study at any time without penalty. I can ask that specific responses be removed from recordings and transcripts during or after the interview.

Print Participant Name ____________________________________________

Participant Signature _________________________________ Date __________

I hereby certify that I have given an explanation to the above individual of the study and its risks and protections.

Researcher signature

If you have any questions, contact:
Richard Rosa (810) 623-0065, rarosa@cpp.edu
or
Dr. Betty Alford, btalford@cpp.edu

Copy to be provided to participant.