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Fostering Creative Thinking Skills in Young Children Using Design Thinking Challenges

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by

Tom R. Gannon

An Abstract of a Project
in
Creative Studies

Submitted in Partial Fulfillment
of the Requirements
for the Degree of

Master of Science

April 2020

Buffalo State
State University of New York
Department of Creative Studies

ABSTRACT OF PROJECT

Fostering Creative Thinking Skills in Young
Children Using Design Thinking Challenges

For this master's project I developed a set of resources (guidebook, videos, and presentation deck) which provide child development professionals with a framework and set of skills to facilitate design thinking challenges (open-ended problem-solving activities based on design thinking's phases of: creating empathy, problem identification, ideation, prototyping, and idea testing) with preschool age children. The centerpiece of the project is the guide book titled *Save the Gingerbread Man: Understanding & Supporting Creative Thinking Skills in Preschoolers*. The videos are interviews with preschool age children in a series called *From the Experts*. The presentation deck incorporates can include the videos in support of the guidebook. The intent of the project's outcome is twofold. First, to educate early childhood educators about the value and importance of fostering creative thinking skills in young children, and second to provide a resource which allows the educators to act upon the knowledge.

Tom R. Gannon

April 14, 2020

Date

ACKNOWLEDEMENTS

This project was possible because of support provided by my colleagues at Barron Park Preschool. Their willingness to give me time outside the classroom afforded me the time and mental space needed to address the details and requirements of the project. Their curiosity and support for creativity has been invaluable for both my learning and our program's evolving ability to meet the needs of the children in our care. Specifically, I want to acknowledge Kim Adams who has been my biggest supporter, both personally and professionally. She has been a consistent sounding board, voice of reason, and enthusiastic supporter for creativity at Barron Park Preschool. I also want to acknowledge Dr. Gerard Puccio, Dr. Selcuk Acar, and Dr. Susan Keller-Mathers who have consistently provided encouragement for the work I am doing with preschool age children and creativity. Their belief in my influence and creative leadership at a small preschool in Palo Alto, California has made a lasting impact on my perspective and self-confidence.

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April 14, 2020

Susan Keller-Mathers
Associate Professor

April 14, 2020

Tom R. Gannon
Student

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SECTION ONE: BACKGROUND TO THE PROJECT

Early childhood education (ECE) is a second career for me. While I have been in the ECE field since 2008, my background is rooted in marketing and advertising. For 20 years I held positions as marketing manager, communication manager, sales manager, or marketing director for both national and local companies. My undergraduate degree, which I earned in 1989, is in business administration with an emphasis in marketing and a minor in advertising.

As a manager in marketing and advertising, communication briefs were part of every campaign I worked on. Communication briefs provide goals and guidelines for marketing campaigns. The goals vary in nature and can be defined as sales goals, customer retention goals, customer conversion goals, or goals of total impressions and reach. Communication brief also include requirements and limitations specific to each marketing campaign. Regulatory requirements (the fine print), budget limits, legal requirements, specific deadlines, and geographic boundaries are common constraints. With goals and constraints clearly set, it is the responsibility of creative teams to develop communication, marketing, and advertising campaigns (ideas and strategies) to achieve the goals while staying within constraints. Campaign development is an iterative process, with hundreds of ideas generated through brainstorming. Creative teams select the best ideas and develop them further through iterative development phases. The marketing campaigns which are selected as the best of the best get presented to clients for approval and implementation. Campaigns are then closely monitored and outcomes are quantified and measured against the initial goals. Results provide feedback which could necessitate changes to the messaging or require modifications to media buys. Involvement with these processes created conditions in my career to experience what Mihaly Csikszentmihalyi calls flow; the experience of optimal performance.

My temperament and skillset are well suited for the responsibilities and activities mentioned above. However, office politics and the demanding pace in the world of advertising took a toll. Opportunities within my field also changed with corporate mergers and the crash of

the U.S. housing market in the early 2000's. In 2008 I was without a job but with the opportunity to choose a new path.

I unexpectedly entered the world of early childhood education by offering to help with business and accounting tasks at the preschool my girlfriend owns. I was initially struck by the natural occurrence of iterative learning processes predominant in children's play. I saw an immediate connection to the iterative creative processes in marketing and advertising. I also noticed how children took their less-than-perfect performance in stride while learning tasks and developing abilities. They were comfortable making mistakes to achieve intended goals and outcomes. This was reminiscent of the professional-c creative processes I was familiar with; many ideas need to be presented and refined to develop the best solution possible. The key here is finding the best solution…not the only solution.

I began connecting the phases of design thinking to experiences in the preschool; the stories we read, experiences we had, and situations we noticed. During this same time period, I was introduced to open-ended problem-solving challenge at a workshop I attended. The challenge, which I remember well, was how to keep Big Foot safe from the expansion of the city into his territory. The adults at the workshop were divided into groups of four and five, and given pieces of paper, tape, paper clips and rubber bands. Each team was given 15 minutes to develop a possible solution, and then expected to present their solution to the larger group. This experience was germinal for me to begin introducing design thinking challenges, similar to the Big Foot challenge, to the children at the preschool. Since this initial inspirational moment, the children at our preschool have worked on dozens and dozens of similar challenges. The children get engaged, and seem to love the challenges. An unintended result has been observing increased cooperation in their play outside of the challenges. In addition to these experiences, design challenges also support creative thinking which is "very highly correlated with self-concept and academic and social learning—the viable elements of intelligence" (Trostle & Yawkey, 1982, p.2).

I have had the opportunity to introduce design thinking challenges to hundreds of ECE educators through workshops at local, state, and national conferences, as well as at educator exploration days hosted at our preschool on weekends. The common experiences I observed are: (a) Teachers have not heard of design thinking; (b) Teachers have not been exposed to design thinking challenges; (c) Teachers love participating in design thinking challenges themselves; (d) Teachers express positive experiences in both cognitive and affective domains, and; (e) Teachers, when exposed to design thinking challenges, express a desire to facilitate design thinking challenges with their students.

The importance of fostering creative thinking skills in young children is of growing importance. Rapidly changing economies, yet to be developed technologies, undefined future skill sets, and changing political climates ensure 21st century learners will have an uncertain future for their careers. Organizations such as IBM and the World Economic Forum continue to stress the need for soft skills including creativity. At the same time children in the United States continue to show a decline in creativity.

The question I feel called to ask is: What can I do to improve the creative future of our children? For me, the answer is to insert influence with the skillset I have. The rationale for this project is to create awareness for the need of creative thinking skills and provide the ability for child development professionals to support creative thinking skills in an understandable, non-intimidating, and playful way.

My personal goals for this project include:

- To survey the landscape of resources commonly available to child development professionals which aid in supporting and fostering creative thinking skills through the use of design thinking challenges.
- To make professional contacts and enlarge my professional network in support of creative thinking skills and design thinking with preschool age children.
- To identify gaps in the current body of information and resources.

- To fill the gap with easy to use resources for early childhood professionals. The resources will provide a framework and tools to facilitate design thinking challenges with preschool age children.
- To share the created resource through my school's website, my website, workshops that I present, and with the ECE leaders.
- To enhance learning and enjoyment experienced by both children and early childhood professionals while supporting creative thinking skills.

SECTION TWO: PERTINENT LITERATURE

To gain an understanding of the landscape of resources available in support of creative thinking skills in young children, I surveyed five areas of knowledge: (a) Literature developed for early childhood professionals; (b) Literature developed for the general public and business community; (c) Scholarly articles; (d) Electronic media such as YouTube, podcasts, and websites, and; (e) Conversations with an early childhood education (ECE) department head at a community college and with the Director of Child Development for a San Francisco Bay Area school district.

There are less than a handful of publishers that proactively promote their catalog of publications to teachers and administrators of early childhood education. These publishers include well-known companies such as Redleaf Press, National Association for the Education of Young Children (NAEYC), and Gryphon House Books. There are very few resources, and even fewer contemporary resources dedicated to fostering creative thinking skills in young children. While the National Association for Gifted Children (NAGC) has limited resources for purchase on the topic, I discovered that preschool teachers and local community college instructors do not see NAGC as a resource for “non-gifted” child development centers or family child care homes. The literature listed below are the most influential and inspiring resources I identified for this project.

Pertinent Literature

Sources from academia, business, and early childhood education have influenced, informed, and inspired my journey with creativity. The sources listed below have had the deepest impact on my view of creativity and opportunities I sense within the field of education. The sources have also shed light on my personal path of practicing creativity and helped me to see my skill set and career as unique assets suitable to champion creativity in preschool age children and their educators. Findings in these sources have informed where I am and where I want to go with creative thinking.

Amabile, T., & Kramer, S. (2011). ***The progress principle: Using small wins to ignite joy, engagement, and creativity at work.*** **Harvard Business Review Press.**

Previous research on creativity in the workplace has focused on perceived support. Where this book differs, is that it documents the day-to-day cognitive and affective reactions individuals have to their experiences at work. The book was written for leaders (and those who aspire to be leaders) who are curious about what "they can do, day by day, to support the kind of inner work life that leads to extraordinary performance—an inner work life marked by joy, deep engagement in the work, and a drive for creativity" (p. 2). Inner work life consists of the perceptions, emotions, and motivations people experience from interaction at work. Amabile describes the inner work life effect as people doing better work when they are "happy, have positive views of their organization and its people, and are motivated primarily by the work itself" (p. 47). When people have positive inner work life, they have more attention to tasks, are more engaged in their work, and have greater intention to work hard. The emotions associated with inner work life have both a positive and negative effect on "creativity, decision making, and negotiations" (p. 31). People want to succeed at meaningful tasks, they want to contribute, and they want to matter. Making progress on meaningful work on a regular basis is the number one predictor of positive engagement in people's work life. The fundamental prerequisite for the progress principle is that people must be engaged in work that meaningful and perceived to be "contributing value to something or someone who matters" (p. 96). Factors that make work feel meaningful include feeling like work is contributing, having a sense of ownership over work, and aligning people and tasks so people don't feel over qualified for their jobs. The everyday actions of people in the workplace can be catalysts or nourishers to progress and subsequently to inner work life. Conversely, everyday actions can inevitably be inhibitors or toxins to that same progress. Catalysts "directly support the work" (p. 82), and include receiving help from people or groups, being given adequate resources and time, and having problems removed that interfere with progress. The number one catalyst to positive inner work life is having clear goals.

Nourishers to inner work life are interpersonal and include respect, encouragement, and various forms of social and emotional support.

Cropley, A. J. (1995). Fostering creativity in the classroom: General principles. In M. Runco (Ed.), *The Creativity Research Handbook,* Vol. 1 (pp.83–114). Hampton Press.

Cropley's work brings clarity to the behaviors and attitudes teachers should embody to support creative thinking skills in children. A summary of Cropley and E. Paul Torrance's work identifies five suggested values teachers should promote in their students. These values are: persistence and determination; curiosity and tolerance for ambiguity; independence and nonconformity; self-confidence and willingness to be wrong, and; experimentation and willingness to tray difficult tasks. Cropley noted that individuals who scored high on creativity testes "obtained significantly higher scores in life areas" (p. 106) such as leadership, art, and music. These accomplishments are categorized as nonacademic talented accomplishments and are seen as pertinent to ability outside the classroom. These findings emphasize the importance of fostering creative abilities in children. Another interesting finding was that "creative teachers tend to be more supportive of creative students" (p. 97). Three take-aways from Cropley's work are (a) challenge children to be open for the novel, (b) give children courage to think for themselves and to seek new, and, (c) show respect for children and their achievements to foster in them self-confidence and high expectations. Deliberately attempting to foster creativity is more effective that "simply reducing the level of formality in the classroom or exposing children to a wider variety of experiences" (p. 85).

Csikszentmihalyi, M. (1996). *Creativity: Flow and the psychology of discovery and invention.* HarperCollins Publisher.

Creativity: Flow and the Psychology of Discovery and Invention (1996) by Mihaly Csikszentmihalyi is considered a classic in the field of creativity and psychology. The book is compiled from 91 interviews with eminent creative people whose careers and work are marked

by ground breaking discoveries, socially influential ideas and concepts, Nobel Prizes, and making connections between seemingly disparate ideas and fields of study. I was especially influenced by two of the chapters. Chapter three, “The creative personality” sheds light on the personality characteristics which are hallmarks of creative individuals. “They show tendencies of thought and action that in most people are segregated” (p. 57). The complex personalities of creative people integrate the following ten polarities without inner conflict: Physical energy and rest: intelligence and naivety; playfulness and responsibility; imagination and reality; extroversion and introversion; humility and pride; masculinity and femininity; traditionalist and rebellious; passionate and objective, and; suffering and enjoyment. “To be creative, a person has to internalize the entire system that makes creativity possible” (p. 51). Chapter fourteen “Enhancing personal creativity” distills the insights in the book and presents them as suggestions to enhance creativity. Some suggestions are “appropriate to parents or other adults who want to provide optimal conditions for developing the creativity of children” (p. 344). Csikszentmihalyi suggests providing environments that are physically and emotionally supportive and nurturing; encouraging and creating surprises in life; noticing what created surprise and communicate it; support emerging interests; make everyday activities more enjoyable; increase the complexity of enjoyable activities, make time for reflection; look at problems from numerous vantage points; implement solutions, and; support divergent thinking. These two chapters provided spark and insight to my professional exploration of supporting creativity with young children.

Isbell, R., & Yoshizawa, S. (2016). *Nurturing creativity: An essential mindset for young children’s learning.* NAEYC Books.

This is one of the few contemporary publications for early educators which addresses broad factors influencing children’s creativity and creative thinking. While the book’s intended audience is early childhood educators (primarily preschool and transitional kindergarten) the book’s references include a powerhouse list of authors and researchers such as: Amabile,

Csikszentmihalyi, Fusco, Gilford, Isaksen, Kim, Piaget, Runco, Torrance, and Vygotsky. The publication begins by outlining why creativity is so important for today's children as we move out of the information age and into the "conceptual age" (p. 9). The authors note creativity scores, measured by the Torrance Tests of Creative Thinking (TTCT), show a significantly drop from 1990 to 2011 for adults and children. This drop in creativity was found through the research of Kim. The publication takes a thorough approach to addressing creativity by building on the framework of process, environment, person, and product. It looks at the creative thinking process that includes preparation, incubation, illumination, and verification—saying "process in king" (p. 23). Torrance's view of creativity is also presented in a very approachable manner. The publication includes Torrance's seminal work on divergent thinking is presented from a child's perspective and includes originally, fluency, and flexibility. Divergent and convergent thinking skills are explained with the example of asking children which areas can artwork be displayed, and then selecting one of them. Understanding these fundamental cognitive processes helps children see now thinking skills "can lead to creativity" (p. 27). Several elements supportive of creative environments are explored. These include the traditional learning centers such as blocks, science, art, and music. The book goes deeper to include children input on sounds, color, lighting, and how to make the space feel warm and nurturing. Subsequent chapters address the characteristics of creative children and adults, and bring light to the role that adult creativity and adult support has on children and their beliefs about creativity and their abilities. Fostering traits such as curiosity, independence, playfulness, adventurousness, imagination, and lack of inhibition. The characteristics of childhood creativity are compared to the correlating characteristics of creative adults. For example, adventurous children tend to try new things as adults. The importance of documenting and displaying children's creativity encourages their confidence. Documentation and observations of children's learning and play give educators the "opportunity to refine [their] questioning skills and scaffold children's thinking" (p. 127).

Kelley, T. (2001). ***The art of innovation: Lessons in creativity from IDEO, America's leading design firm.*** **Doubleday.**

The Art of Innovation: Lessons in Creativity from IDEO, America's Leading Design Firm (2001) by Tom Kelley serves as a personally influential and inspirational book about the processes, people, and environments "that feed your creativity engine" (p. 127). The concepts presented in this book are adaptable to fostering creativity in preschool teachers, classrooms, and children. Concepts such as physical spaces that "inspire and amuse," (p. 127) and responsive to the needs of the people in them is true for adults and children. The concept of prototyping (chapter six) highlights the real value of being in action with ideas. Once ideas start taking physical space, people are able to start imagining and interacting with them on deeper levels. Prototyping is "one of the foundations" of the culture at IDEO which influences their "childlike curiosity and enthusiasm" (p. 105). "Build to learn" is a mantra used by an IDEO studio head. Being open to uncertainty during the creative process is key to seeing the way out to clarity. Finding balance between planning and unpredictability is a necessary skill to have when engaged with creativity. Expecting ups and downs and not putting too much stock in either one help moderate the creative processes as well.

Kelley, T., & Kelley, D. (2013). ***Creative Confidence: Unleashing the creative potential within us all.*** **Crown Business.**

Creative Confidence: Unleashing the Creative Potential Within Us All (2013) by Tom and David Kelley has been a source of great inspiration for my personal journey of diving deeper into creativity and my studies at Buffalo State College. David Kelley is the founder of Stanford d.school, and IDEO, an international brand consulting firm that uses design thinking to identify end-user needs and develop solutions to meet those needs. The book presents design thinking as a mindset, and people who use the creative techniques in the book "are better able to apply their imagination" and "have the ability to improve on existing ideas and positively impact the world around them, whether at work or in their personal lives (p. 18)." Design thinking is

presented in four phases which are iterative and overlapping. The first phase of design thinking is inspiration. At the heart of inspiration is having empathy, “connecting with the needs, desires, and motivations of real people (p. 22).” It is human centered and often requires documenting observations made at the point of a person’s experience with a product or service. The second phase is synthesis which is the “sense making” process for the things seen, gathered, and observed from inspiration. In this phase the problem is reframed to focus attention and resources. The third phase is ideation and experimentation. This phase incudes brainstorming, divergent thinking, and rapid prototyping. Rapid prototyping is another hallmark of design thinking and allows ideas and concepts to be tested to observe peoples’ reactions. Rapid prototyping promotes “exploring a range of ideas without becoming too invested in only one” (p. 23). The iterative phases of ideation and experimentation allows for adaptation and improvements leading to “human-centered, compelling, workable solutions” (p. 24). The last phase of design thinking is implementation. Implementation takes a new idea into the market and live with customers. Organizations that use design thinking will use the implementation phase as a learning opportunity as well. Many companies now do phased roll-outs to learn from each launch to improve the next. The mindset of creative confidence allows individuals to use the phases of design thinking in any area of their life.

Kim, K. H., (2011). *The creativity crisis: The decrease in creative thinking scores on the Torrance Tests of Creative Thinking. Creativity Research Journal, 23*(4), 285–295.

In this paper, Kim reviews raw data from the Torrance Tests of Creative Thinking (TTCT) Figural portion of the tool collected between 1966 and 2008. The data encompassed the results from 272,599 participants. The TTCT-Figural measures: fluency, originality, elaboration, abstractness of titles, resistance to premature closure, and creative strengths (comprised of 13 creative personality traits). The paper discusses the analysis of the data as it relates to creativity in several ways. One way is how has creativity changed over time as it relates to the general population of people from kindergarten to adulthood, such as how have fluency and originally

scores changed from 1984 to 2008. It also discusses how aspects of creativity rise or fall over peoples' lives, primarily from kindergarten through high school, and then into adulthood. What the study found was that student's creativity has been on a decline, notably since 1990, while at the same time IQ scores and SAT scores have been on the rise (p. 285). The paper mentions the findings of Hirsh-Pasek, Golinkofff, Berk, & Singer (2009) which states that the amount of free play that children engage in has decreased over the past few decades. It also mentions that "hurried lifestyles and a focus on academics" (Hirsh-Pasek & Golinkoff. 2003) has been the antecedent to reduced playtime for children. The correlation between the decline in creativity scores and the amount of time children have to play is worrisome. The results are indicating that young children are not developing basic tools needed to succeed at endeavors that require creativity such as intellectual curiosity, the ability to synthesize and organize information, and seeing things from different angles. Rogers, Gardner, Vygotsky, and Piaget all have theories about human development that include the need for time and freedom to play, reflect, and collaborate. The United States educational system has pursued standardized testing and national standards being measured by IQ and SAT tests. Unfortunately, our education system has not addressed the value and need for creativity and creative problem solving for our students and the country's future.

Leggett, N. (2017). Early childhood creativity: Challenging educators in their role to intentionally develop creative thinking in children. *Early Childhood Education Journal, 45,* 845–853.

Leggett's research article focuses on key aspects of creativity and childhood. She argues that developing a broad and accepted definition of creativity for childhood is necessary to help educators be more supportive. The definition must be sensitive to the standard definition which includes novelty and usefulness, while considering children developing new learning and transformative activities within the "children's community" (p. 851). It has been noted that "The relationship of pedagogical practices in early childhood education and care as it applies to the

development of creative thought processes of young children is relatively new" (p. 845). Leggett proposes that educators need to focus more on the intentions and cognitive processes of creativity than on the artifacts being created. There should be an emphasis on the "process of developing creative thinking in children" (p. 850) and supporting dispositions for creativity such as curiosity, perseverance, and confidence. Leggett urges educators to use strategies to support creative thinking. These include using "open questioning, providing provocations, suggesting ideas, seeing alternatives, finding possibilities, planning, and encouraging" (p. 851). Leggett's research found that educators see children as the "creators" in their play, yet do not understand their own role to support creative thinking skills in young children. Early childhood is a unique window of time for producing neural pathways which "lay the foundation for future innovators and creative thinkers" (p. 846). While educators understand that providing environments that support "happy states in children" is connected to childhood creativity, there was a "lack of connection between the role of the educator and the creative thinking of children" (p. 851).

Puccio, G., Mance, M., Switalski, L., & Reali, P. (2012). ***Creativity rising: Creative thinking and creative problem solving in the 21st century.*** **ICSC Press.**

This was the first book about creativity I was exposed to upon entering the master's program for Creativity and Change Leadership at Buffalo State College. The framework of separate phases of creative thinking and problem solving resonated with my innate beliefs and experiences. Exposure to the material in this book crystalized my focus on learning about creativity and how to intentionally engage with creativity in my professional life. The creative change model presented depicts the facets of environment, person, and process, and how they "interact to yield creative products and eventually produce creative change" (p. 33). The model has influenced my understanding of my role and responsibility of working with young children. *Creative Problem Solving (CPS): The Thinking Skills Model* presents creative thinking skills on numerous levels. The three conceptual stages of problem solving are clarification,

transformation, and implementation. The three stages “reflect the natural creative process that people apply” (p. 74) when faced with challenges that need new ideas. The CPS model dives deeper to introduce two formal steps to each. Clarification requires exploring the vision and formulating challenges. Transformation state requires exploring ideas and formulating solutions. Implementation stage requires exploring acceptance and formulating a plan. “Deliberate creativity is the result of both thinking and emotion” (p. 102). Practitioners using the CPS process will also employ affective skills at specific stages of the process. The affective skills include dreaming, sensing gaps, playfulness, avoiding premature closure, sensitivity on one’s environment, and tolerance for risk. There are three affective skills “that support the entire process” (p. 123) which are openness to novelty, tolerance for ambiguity, and tolerance for complexity. Becoming aware of thinking and affective skills has allowed me to support and foster these skills in young children.

Westby, E. L., & Dawson, V. L. (1995). Creativity: Asset or burden in the classroom?

***Creativity Research Journal, 8*(1), 1–10.**

This article made me consciously aware of how I (and educators) can have a bias against creativity and creative children. Westby and Dawson’s synthesis of previous research in educational studies as well as two new studies make clear the struggle educators have with aligning their stated beliefs and actual behavior regarding creativity and personality traits associated with creativity. Earlier research indicated that “teachers prefer traits that seem to run counter to creativity” (p. 1). Torrance identified some of these traits as “obnoxious” while other characteristics such as determined, independent, and individualistic are not the most highly valued in the classroom. Although teacher report that creativity is valued in the classroom, they do not value creative traits in students. Westby and Dawson noted that previous research suggested that creative behavior was actually being punished in the classroom by teachers reportedly voicing support for creative behavior. Another study cited by Westby and Dawson found only half of the teachers in the study viewed divergent thinking as “an important aspect of

creativity" (p. 2). In Westby and Dawson's new first study, they found positive correlations between teacher's least favorite student and the creative prototype. They also found a significant negative correlation between their favorite student and the creative prototype. What this showed is that teachers' least favorite students showed "more similarities to the creative prototype that did their favorite students" (p. 6). Westby and Dawson's second study reported that teachers do not agree on the characteristics of creative students. They reported less than half the teachers in the study agreed on characteristic of creative students. Teachers identified characteristics such as sincere, responsible, good-natured, reliable, and logical suggesting that students need to be easy to manage to be considered creative. They also reported more than half of the teachers excluded characteristic such as "is a nonconformist" and "tends not to know own limitations" and "tries to do what others think is impossible" (p. 8) when describing creative students, which is hard to explain considering most definitions of creative behavior.

Soh, K., (2016). Fostering student creativity through teacher behaviors. *Thinking Skills and Creativity, 23*, 58–66.

In this article, Soh begins framing the discussion of creativity by noting the tradition of societies looking to educational institutions to supply their needs. As the global economy increases its demand for creativity, school have the "obligation to produce students who display creativity" (p. 58). However, schools are expending resources to perpetuate societies accumulate knowledge, much of which will soon be obsolete. Creativity is an overarching subject, touching all domains of study and teachers must "teach creativity as part of the subjects they are specialized in" (p. 58). Soh theorizes there are three ways to foster preschool children's creativity: (a) social modeling, (b) reinforcement, and (c) classroom ecology. All three have studies supporting their effect on students' creativity; there are limitations to each. Social modeling depends on the creativity of the teacher and positive emotional ties between the teacher and students. Reinforcement is extrinsic and requires the teacher to observe the creativity to recognize and reinforce it. Classroom ecology provides an immersive social

environment which promotes creativity, and circumvents the limitations of social modeling and reinforcement. However, classroom ecology requires two conditions: relative freedom from "constraints of limitation of the teacher" and "student's spontaneous creativity" (p.60). Soh then looks to the work of Arthur J. Cropley, *Fostering Creativity in the Classroom: General Principles* (1995). Based on Cropley's review of the literature, nine teacher behaviors which foster students' creativity were identified. Teachers who routinely engage in these behaviors will support characteristics necessary for creativity and creative thinking in their students. The characteristics are: (a) independence, (b) integration, (c) motivation, (d) judgement, (e) flexibility, (f) evaluation, (g) question, (h) opportunities, and (i) frustration. To promote research on, and greater understanding of creativity, Soh operationalized these nine characteristics into a 45-item self-assessment with five statements for each characteristic. His research tool, called the Creativity Fostering Teacher Behavior Scale (CFTIndex) serves as both an instructional tool and measurement of creativity fostering in the classroom context. His tool shows both reliability and validity in multiple tests.

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SECTION THREE: PROCESS PLAN

How I Plan to Achieve My Goals and Outcomes

The deliverables for this project are a set of resources for early childhood education (ECE) professionals. A guidebook titled *Save the Gingerbread Man: Understanding & Supporting Creative Thinking Skills in Preschoolers* will be the project's centerpiece. The guidebook will educate early learning professionals to the importance of creativity, fostering creative thinking skills in preschool age children, and how design thinking supports childhood creativity. The guidebook will also show ECE professionals how to facilitate open ended design thinking challenges with children in their classrooms. The other components of the resource will include video interviews with young children whom have been involved with design thinking challenges, and a presentation deck to be used at workshops and conferences. Parental permission for student images and video recording is specifically outlined in the preschool's handbook and admission agreement, and permissions are obtained as part of the normal operating procedures of the school. Additionally, permission was granted for use of these items in the master's project.

To accomplish this goal, literature will be reviewed, online and electronic resources will be searched, conversations with preschool teachers, parents, college instructors, and a college student will be made, and physical products will be produced. A timeline of major milestones and deliverables is presented in Table 1. The goals of the project and their measurable deliverables are presented in Table 2.

Table 1. Project Timeline and Action Plan.

Activity	Deadline	Hours to Complete	Support Needed
Whole class meeting: Project direction	February 1, 2020	3	Dr. Susan Keller-Mathers, CRS690 Class
Concept Paper	February 3, 2020	12	Dr. Susan Keller-Mathers
Project implementation	February 3, 2020 to March 30, 2020		Co-teachers, preschool parents, collogues, college student

Activity	Deadline	Hours to Complete	Support Needed
Proposal approval	February 10, 2020	4	Dr. Susan Keller-Mathers
Section 1-3 draft complete	February 17, 2020	16	Dr. Susan Keller-Mathers
Conduct review of available resources, both online and print, that have a focus on design thinking challenges and preschoolers	February 24, 2020	40	Tom Gannon
Sections 1–3 final complete	February 24, 2020	24	Dr. Susan Keller-Mathers
Guidebook prototype 1.0. Identify essential elements to convey topic importance and provide facilitation ability	February 27, 2020	36	Tom Gannon
Guidebook prototype 1.0 used by first year college student. Feedback collected and guidebook revised to create prototype 2.0.	February 28, 2020	8	First year college student
Guidebook prototype 2.0 provided to (a) growth mindset trainer/preschool parent, (b) college professor/preschool parent, (c) colleague and design thinking challenge co-collaborator, and (d) ECE college adjunct professor/preschool teacher for review and feedback	March 2, 2020	12	Liz Cohen, Julia Grinkrug, Kim Adams, and Jennifer Wang
Guidebook prototype 3.0	March 6, 2020	16	Tom Gannon
2020 Vision Conference: Present creativity workshop and introduce guidebook prototype 3.0	March 7, 2020	8	Carol Phillips
Co-teacher new to design thinking challenges to use guidebook for design challenge facilitation on their own. Observe and revise guidebook.	March 13, 2020	16	Co-teacher
Guidebook prototype 4.0	March 19, 2020	14	Tom Gannon
Present guidebook to ECE department chairperson at Foothill College	March 24, 2020	8	Nicole Kirbey
Whole class meeting: Sharing results	March 28, 2020	3	CRS690 class
Sections 4–6 draft completed	March 30, 2020	20	Tom Gannon, Dr. Susan Keller-Mathers
Final project write up	April 13, 2020	20	Dr. Susan Keller-Mathers
Project approval. Digital Commons upload	April 27, 2020	4	Dr. Susan Keller-Mathers

Activity	Deadline	Hours to Complete	Support Needed
Project completion and presentation	May 2, 2020	3	Dr. Susan Keller-Mathers
Course Evaluation	May 11, 2020	1	
Create a feedback loop for early childhood professionals who have used the resource and facilitated design thinking challenges with their students	Ongoing		
Modify guidebook as necessary	Summer 2020	20	
Develop other products	2021 (ongoing)	unknown	
Measure success through feedback, downloads, revenue?	2021 (ongoing)		

Evaluation of this project includes the formation of goals and measurable deliverables for each goal. Table 2 below lists the major goals and the corresponding measure for its completion and success.

Table 2. Key Evaluation Assessments Towards Goals.

Goals	Deliverable
Identify and examine the available resources (print and electronic) currently supporting design thinking challenges with preschool children.	Collect all data and research associated with key work search.
Identify gaps in the existing resource landscape and identify opportunity emanating from the gap(s) in existing resources.	Analyze and synthesize the collected date and identify gaps and opportunities.
Develop a guidebook that captures the essence of creativity, design thinking challenges, and how to facilitate them which fills the gap in resources for early childhood educators and child development professors.	Have a physical or digital resource that can be used by others.
Share the developed guidebook through my school's website, my website, workshops I present, and directly with ECE.	Upload and share developed resource.
Identify other educational outlets and share the developed resource.	Identify new opportunities to expand the distribution of developed resource.

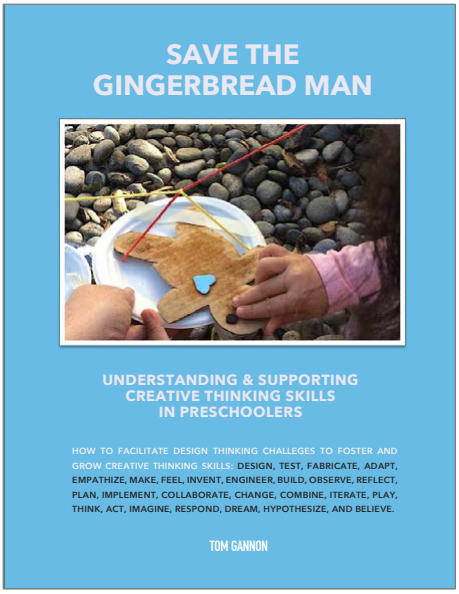
SECTION FOUR: OUTCOMES

The results of this project are four complimentary components. The first component is a fifty-two-page guidebook titled *Save the Gingerbread Man: Understanding & Supporting Creative Thinking Skills in Preschoolers*. The second component is a video library seeded with three interviews with preschool age children about their experiences with design challenges. The third component is a deck presentation which introduces early childhood education (ECE) educators to the concepts of understanding and supporting creative thinking skills. The deck will be used at workshops and conference presentations. The fourth outcome is collaborative relationships with colleagues and ECE leaders in my community. These relationships were strengthened through the iterative prototyping and testing phases central to the development of this project.

A Guidebook for Early Childhood Instructors and Educators

Save the Gingerbread Man: Understanding & Supporting Creative Thinking Skills in Preschoolers (Figure 1) is a guidebook designed to inform ECE educators about the importance of understanding and supporting creative thinking skills in preschool age children.

Figure 1. Cover Image for Save the Gingerbread Man: Understanding & Supporting Creative Thinking Skills in Preschoolers.



The guidebook builds upon knowledge ECE educators obtain during their college courses. The topics of the guidebook (Table 3) address creativity from societal, classroom, and personal perspectives. The first sections define creativity, creative thinking, innovation, and address the importance of creative thinking skills. Creative thinking skills are presented through the lens of The World Economic Forum, Bloom's revised taxonomy for the 21st century, and research data collected from corporate executives. The middle sections highlight the personality characteristics (behaviors and traits) of creative personality, emotional and cognitive spectrums creative individuals operate along, teachers' existing knowledge and how to extend it to support creativity, and teachers' often negative bias towards creative behaviors and traits. The last sections present the phases of design thinking and design thinking challenges (also called design challenges) as they apply to preschool age children. The last sections also overlay design thinking and design challenges onto the classic childhood story *Save the Gingerbread Man*. These sections introduce educators to the adults' role while facilitating design challenges, typical supplies used, and design challenge ideas to encourage educators to get started. Selected pages from the guidebook can be found in Appendix A.

Table 3. Table of Contents for Save the Gingerbread Man Guidebook.

Section Titles	Section Sub-Topics
Welcome	• Introduce the author and the topic of creative thinking
This guidebook and you	• The intent and desired outcomes for the guidebook
What is creative thinking and why is it so cool?	• Divergent and convergent thinking in the classroom • Bloom's revised taxonomy for the 21st century • Children need creative thinking skills – not just knowledge • The world needs creativity • What is creativity and innovation? • Creativity leads to innovation • Preparing preschoolers for the future
Creative behaviors and hidden biases	• Behaviors of creative people • The spectrums of emotional and mental polarities • Teachers can foster children's creative thinking skills • Hidden biases
Supporting creative thinking skills in preschoolers	• What are design challenges? • A dozen reasons for using design challenges • Facilitating design challenges

Section Titles	Section Sub-Topics
The adults' role during design challenges	• Setting the stage • The closing scene • Final credits • Dealing with frustrations
Typical supplies for design challenges	• Supplies should be free or low cost • Supplies can be found in most classroom
Ideas to get you started	• From books • From stories we made up • From observations the children made
About the author	• My personal history with creativity
References	• Resources which are cited in the guidebook

Video Interviews with Preschoolers

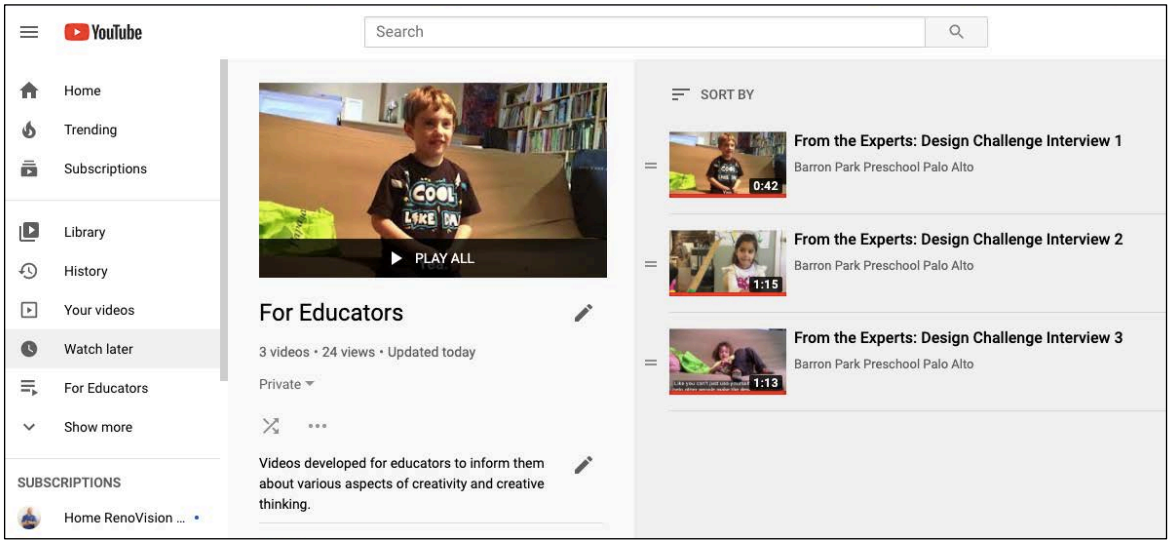
The second component of the project is the launch of a video library consisting of interviews with four- and five-year old children who participated in design challenges. Three children were asked a variety of questions and their unscripted responses were recorded in single takes, each approximately ten minutes in length. The video interviews were reviewed and edited to capture their essence. Titles, question slides, and closed captioning were added to make it easier to follow along. Table 4 lists the questions and topics covered in the three videos. The video interviews capture the heart of design challenges and provide inspiration and anecdotal evidence for their acceptance and value. When asked what design challenges are, a young boy said "It's when you get to come up with our own ideas; the teacher can't tell you." When asked about the best part of design challenges, a four-year old girl replied, "The thinking part." She also said, "You need to come up with a new plan" when asked what should happen if your idea doesn't work. Two of the children were asked what other kids should know about design challenges, they said, "That they could do them," and, "You have to come up with your own ideas." The videos have been uploaded to a private playlist on YouTube (

Figure 2) and are accessible by teachers from Barron Park Preschool and the children's families. The videos will be shown to educators at workshops and conference presentations. Selected screen shots from the videos are available in Appendix B.

Table 4. Topics and Questions in the Design Challenge Video Interviews with Preschoolers.

Video Title	Questions Asked in the Video	Topics Addressed
From the Experts: Design Challenge Interview 1	• What should teachers know about design challenges? • What would you tell other kids about design challenges? • Do you think other kids will like design challenges?	• Self-directed learning • Resilience • Growth mindset • Encouragement
From the Experts: Design Challenge Interview 2	• What's the best part of design challenges? • What do you want other kids to know about design challenges? • What if your ideas don't work?	• Creative thinking skills • Planning • Encouragement • Persistence • Growth mindset
From the Experts: Design Challenge Interview 3	• What are design challenges? • How is empathy used?	• Creative thinking skills • Empathy • Selflessness • Helping others

Figure 2. Screen Capture of Design Challenge Video Interviews with Preschool Age Children Uploaded to Private Playlist.



Presentation Deck for Early Childhood Educators

A presentation deck which complements the guidebook and video interviews was developed. Figure 3 presents three screen shots of the deck for reference. The complete presentation is available in Appendix C. The deck is designed to introduce creative thinking

skills to early childhood educators. The deck can be used in a variety of settings and adjusted for workshops ranging from forty-five minutes up an hour and a half. The presentation strikes a balance between concept and application. There are also interactive experiences for the audience which include choosing adjectives for creativity and conformity, the thirty circles challenge (adapted from E. Paul Torrance's divergent thinking skills test), and an alternate use activity for a Lego®. The contents of the presentation deck are listed in Table 5.

Figure 3. Screen Captures from the Save the Gingerbread Man: Understanding & Supporting Creatice Thinking Skills Presentation Deck.

Table 5. Content of the Save the Gingerbread Man: Understanding and Supporting Creative Thinking Skills Presentation Deck.

Sections	Section Sub-Topics
Welcome	• Welcome attendees to the workshop
Framework for creativity: Environment, process, person, product.	• Introduction to creativity. • Look at creativity from four perspectives.
Behaviors check list: Creative behaviors vs. conforming behaviors	• Activity: Which behaviors are associated most with creativity or conformity?
What is childhood creativity?	• Define creativity and innovation.
Why are creative thinking skills so important?	• Bloom's revised taxonomy for the 21st century. • What is innovation? • Behavior preferences in creative problem solving. • Why is fostering creativity so important, especially for 21st century learners? • Industrial age, information age, conceptual age. • 2018 Future of Jobs Report: World Economic Forum. • Creativity is on a decline. • Activity: 30 Circles

Sections	Section Sub-Topics

How can teachers support preschoolers' creative thinking skills?	• Develop more of your own creativity.
	• Recognize your biases towards creativity and creative behavior (Westby & Dawson, 1995; Cheung & Leung, 2014).
	• Creativity fostering behaviors of teachers.
	• Teachers and judgment, suggestions and questions, and frustrations.
	  ○ Ask questions that invite children to think creatively.
	  ○ Quotes about creativity and failure.

Manifesto for Children by E. Paul Torrance.	• Activity: What item resonates with you most deeply?
Suggested resources for teachers:	• *Creative Confidence* by Tom Kelley and David Kelley. • *Nurturing Creativity* by Rebecca Isbell and Sonia Akiko Yoshizawa
References	• Resources which are cited in the deck

Deepened Professional Relationships

The project utilized design thinking to produce the guidebook, video interviews, and deck presentation. The iterative prototyping and testing phases included an ECE college student, colleagues, a director and educator at a local preschool, two ECE college instructors, and the Director of Child Development for a San Francisco Bay Area school district. Several of these individuals were also included in the empathizing and clarifying phases of the project. Our interactions introduced these individuals to design thinking and the creative problem solving process. Their participation in the prototyping and testing feedback loop ultimately made the final products more human centered and hopefully more effective. Several of these individuals expressed interest in having the guidebook and design challenges introduced into their programs.

SECTION FIVE: KEY LEARNINGS

The process of creating this project has brought clarity to my thinking and understanding of creativity and creative thinking skills, particularly with preschool age children. I am more cognizant of the interplay among the four P's of creativity (person, process, product, and press) presented by Mel Rhodes' in his framework of creativity (Rhodes, 1961). I am more aware of the behaviors and traits present in creative personality as well as the cognitive and affective skills associated with creativity and creative problem solving. My understanding of design thinking and the ability to explain the process to others has grown considerably. This project also brought into focus the environmental factors which have an effect on creativity. This includes the psychological environment, and the availably of time, movement, and resources (Amabile & Kramer, 2011; Isaksen & Akkermans, 2011; Mellou, 1996). I am also aware of what has not been included in this project, which brought a sense of bitter sweet accomplishment with the completion of the guidebook. Seminal work on creative skill sets and taking creative leaps by E. Paul Torrance (Torrance & Safter, 1999) and A. J. Cropley's creativity fostering teacher-behaviors (Cropley, 1995) are two that stand out.

Content Learning

My colleagues and I have been facilitating design challenges with preschool age children since 2009. We understand what we are doing is unique based on comments from ECE instructors, colleagues at other preschools, and ECE professionals we meet at workshops we present. Reactions consistently include surprise, wonder, and interest. The challenge for this project was to present design challenges as a subset to the broader framework of creativity. It seemed that talking about design challenges alone would diminish their importance and leave them out of context. Design challenges and creative thinking skills need to be seen through both a societal and a personal lens. Showcasing design challenges in this creative context should help "sell" their value and hopefully inspire educators to begin facilitating them with preschool age children.

Sensing a Gap

Looking outside the ECE community it's easy to see that creative thinking skills are being touted as important and necessary by IBM (2018), the World Economic Forum (2018), and Bloom's revised taxonomy for the 21st century. Gaining a perspective on ECE instructors' and educators' understanding and support for creative thinking skills was also necessary. This required synthesizing information from conversations with ECE college instructors, text books used in core ECE college courses, syllabi of core ECE college courses, conversations with preschool teachers, and a conversation with a current ECE college student. I discovered that core ECE college curriculum (human development; curriculum development; child, family, and society, and; health and safety) does not adequately address how to support creative thinking skills – even though most educators see childhood as the most creative time in a person's development. I sensed a gap between society's call for creativity and the preparation of ECE educators for the classroom, specifically as it relates to understanding and supporting creative thinking skills in preschool age children.

Learning Without Being Taught

The beauty of design challenges is their ability to foster "what if" thinking; a valuable creative thinking skill. Design challenges encourage young minds to explore possibilities, to learn from their mistakes, to try different approaches, to find joy in challenges, and to respond to intrinsic motivation to discover solutions (Fasko, 2001). The value of engaging preschoolers in design challenges is captured in a quote by Albert Einstein (1897–1955). He said, "I never teach my pupils; I only attempt to provide the conditions in which they can learn." This understanding of learning had a big influence on the content and development of the resources of the project. Creating resources to aide ECE educators' understanding and support of creative thinking skills has increased my competence and confidence. I am better prepared to engage in discussions about childhood creativity, the value of facilitating design challenges, and reasons for providing children the time and space needed to pursue answers to big "what if" questions.

How Much is Enough?

The biggest challenge for the project centered on information: How much is too much, and how much is not enough? Finding the balance between overload and scarcity was a constant concern as information was added in or edited out. Design thinking, like all creative problem solving processes, works best when it becomes an internalized ability and mindset. Learning how to communicate the essential content of design thinking and design challenges without making if formulaic or reduced to a step-by-step activity was also a constant challenge.

Guidebook

Children's creative thinking skills are best fostered when they are intentionally supported by educators (Torrance, 1972). Putting design challenges into the context of creativity was necessary to communicate their importance and appeal. Seeing creative thinking skills from society's viewpoint helps educators understand the importance and value of supporting these skills in preschool age children. This is why the guidebook includes perspectives from IBM, The World Economic Forum, Bloom's revised taxonomy for the 21st century, and research data obtained from corporate executives. It also seemed important to provide the characteristics of personal creativity. This includes characteristic behaviors indicative of creativity and conformity (Pugsley & Acar, 2018), and the cognitive and emotional spectrums that creative people operate within (Csikszentmihalyi, 1996). Making educators aware they likely hold a bias towards creativity and creative behaviors (Cheung & Leung, 2014; Westby & Dawson, 1995) was also important to include. Including information about educators' biases seemed critical to achieve the greatest level of support for children acting creatively. The second half of the guidebook focuses on presenting the stages of design challenges, reasoning behind each stage, and suggested options to proceed through the stages of empathizing, defining, ideating, prototyping, and testing. The processes of divergent thinking and convergent thinking were used to develop the guidebook's content and layout. I am more confident now interacting with the content learned throughout the development and delivery of the project.

Video Interviews

The video interviews were something quite special all on their own. Over the course of my master's program, one of my cohort colleagues referred to the children at the preschool as my "consultants." This term is both enduring and accurate. The consultants benefit from what I am learning and their feedback, both directly and indirectly, is invaluable to me. The term "consultants" provided inspiration for the video interview, and "From the Experts" is used in the introduction of each video interview. The children are indeed the experts as they participate in dozens and dozens of design challenges during their time at the preschool. I learned that the children understand and internalize valuable concepts present in design challenges. Concepts such as growth mindset (Dweck, 2006), resilience (Duckworth, 2016), failure as feedback (Catmull & Wallace, 2014), planning, and helping others (Amabile & Kramer, 2011). I am quite proud that children from the preschool leave for kindergarten with a solid foundation of life skills such as social and emotional intelligence, and creative thinking skills.

Deck Presentation

Developing the presentation deck had similar challenges to developing the *Save the Gingerbread Man* guidebook. Striking a balance between adding too much information and not enough was constantly in the forefront of my mind. The deck has the unique characteristic of being used with a captive audience; a typical workshop can run forty-five minutes to ninety minutes. Providing opportunities for participants to get up and move around, talk with people around them, share ideas, and laugh was needed to support the learning (Meier, 2000). These criteria were used to develop movement component of the deck and presentation. Based on feedback from participants who attended a workshop where the deck was used, a comfortable balance was reached between lecture and attendee interactions. Feedback was received which indicated some attendees wanted less theory and more activities to take back to the classroom.

Process Learning

Facilitating design challenges, and utilizing design thinking in a broader sense, cannot be relegated to a script where variables are inserted to produce a desired outcome. The design challenge process is dynamic and fun. Educators need to retain both of those qualities if they hope to engage young children's minds and bodies in design challenges.

Teaching is the Highest Form of Understanding

The quote, "Teaching is the highest form of understanding" by the Greek philosopher Aristotle (384–322 BC), crystalizes my experience with this project. Although I have been facilitating design challenges with children at the preschool since 2009, the project required me to slow down, take a step back, and re-examine the processes and steps required to successfully navigate through the design thinking process. The process has become a mindset for me – as it rightly should. However, because it is a mindset, the process of walking through each step had become subconscious and innate in nature. I realized that there were two critical steps that needed to be addressed. I needed to examine the "what", "why", and "how" of each step of design thinking and design challenges. Then, once I reconnected to the reasoning and mechanics of the design thinking process, there were two hurdles which needed to be crossed. I needed to communicate the design challenge process to other educators, and more importantly, I needed to communicate how to facilitate design challenges. I found myself chin deep in the axiom of creativity and teaching: I needed to creatively teach creativity so other educators could then teach for creativity.

Feedback Loops

One of the hallmarks of design thinking is collecting feedback from end users who interact with a prototype. Through the project I learned to better receive and incorporate end users' feedback. Design thinking often collects feedback through observation. However, work schedules and the physical distance between myself and individuals testing the guidebook prototypes prohibited observation. This required consistent follow up and follow through. I was

fortunate enough to have an ECE college student visit the preschool early in the development states of the guidebook. He came to observe and assist in a design challenge facilitation. He was provided one of the first prototypes of the guidebook and given time to read through it. As I facilitated children through the design challenge phases of empathize, define, and ideate, he followed along in the guidebook. He then used the guidebook to support the prototyping and testing phases. Observing his interactions with the guidebook, children, and then talking with him after the design challenge provided critical feedback. His feedback and my observations challenged several assumptions I was holding and changed the approach I used to develop the first sections of the guidebook. A photo of the college student working with one of the first guidebook prototypes can be seen in Appendix D.

The Voice in The Gingerbread Man

Creating the *Save the Gingerbread Man* guidebook was cathartic. I was excited to utilize my skills in graphic design to compose the layout and create the graphic illustrations. What I didn't expect was the challenge of determining and maintaining the right "voice" when telling the story. I wanted to strike a friendly, approachable, and authoritative tone which would be easy to follow. The process of maintaining that tone was a big challenge, particularly with numerous prototype cycles stretching over weeks of writing and editing. The process also gave me opportunity to practice an active-voice writing style and leave my passive-voice writing style behind. That is something I am still working on.

Skill Learning

Tools of Visual Communication

The process of creating the video interviews required me to learn about video capture, editing, and production. After viewing the first iteration of the video interview, it was clear that subtitles would help convey the content in a more compelling manner. I researched options to add subtitles and eventually found a website which uses artificial intelligence (AI) to automatically create subtitles on video output. Some editing of the AI's interpretation was

required, primarily due to the varying levels of speech development of the children in the videos. Since the conclusion of the project I have continued to learn about video capture and production. I have researched Bluetooth® lapel microphones (to use at the preschool and during workshops), tripods to hold iPads (for recording workshop presentations), simple lighting techniques, and basic audio techniques for the best possible video captures. I have also become more knowledgeable with YouTube Studio to add soundtracks and modify visual effects.

SECTION SIX: CONCLUSIONS

This project has helped me find a voice to communicate two important aspects of creativity. The first is communicating the characteristics of creative personalities and the importance of recognizing and supporting creative thinking skills in preschool age children. The second is communicating how to support creative thinking skills through the facilitation of design thinking challenges. Including ECE leaders in the iterative prototyping and testing phases of developing the guidebook has opened discussions which may lead to using the guidebook in both college and preschool classrooms. The project has also brought clarity to my views of creative arts and creative thinking. The two are distinct, however they are also complimentary and supportive of one another. Playful environments which encourage creative thinking are enhanced with open ended materials for artistic exploration and expression. The converse is equally true.

Going forward I see myself working with the ECE department head for a local community college and the director of childhood education for a San Francisco Bay Area school district. Both professionals have expressed interest in increasing awareness and support for creative thinking skills through design challenges to their programs.

I see myself developing additional design challenge video resources. This will include adding interviews and documentation of children engaged in design challenges. Building the preschool's online video library will be a powerful resource to inspire and motivate educators to incorporate design challenges into their pedagogy. The director of child development for a San Francisco Bay Area school district said, "I can't wait to get the guidebook into the hands off all my teachers."

Professional Changes

Although I have been facilitating design challenges with preschool age children for over a decade, I feel more comfortable and confident taking children and colleagues through the creative problem solving process. Reflecting on the accomplishments of this project, I feel

enthusiastic and humbled about exposing children to design challenges to foster their creative thinking skills. Documenting and sharing the design challenge process has inspired me to look for other ways to support children's creative thinking skills. Specifically, I envision revisiting E. Paul Torrance's classic *Making the Creative Leap Beyond* (Torrance & Safter, 1999) to find application with the children of Barron Park Preschool.

The objective of this project was to create resources that inform and encourage ECE instructors and educators. I envision extending my work with educators to build their confidence to facilitate design challenges. Including the guidebook and video interviews as resources at workshops I present will add credibility to my work. This project has also helped me become more comfortable with the "how" and "why" of supporting preschool age children's creative thinking skills. Additionally, I see myself building on the professional relationships fostered through the project. I will utilize these relationships to bring the *Save the Gingerbread Man* guidebook into the programs, classrooms, and centers these ECE leaders.

Personal Changes

Communicating the design challenge process through *Save the Gingerbread Man: Understanding & Supporting Creative Thinking Skills in Preschoolers* has helped me find my voice when talking about creativity and ways to support it. The production of the deck and video interviews helped me find my voice in digital mediums. The project in its entirety reconnected me with a passion and interest for creating visual communications, and a desire to continue video content production. Finding ways to connect with millennial and gen-z (post-millennial) educators and parents is increasingly vital for any preschool program. User engagement with YouTube, Vine, and TikTok provides anecdotal evidence that video consumption is a rising trend. As a result of this project, I feel more confident acting on my creative inclinations and will pursue developing knowledge and ability to produce additional video content. This is a natural extension to my artistic inclinations and has become a personal interest to me.

Next Steps

The educators who have watched the video interview have been amazed at the children's comprehension and ability to clearly communicate the cognitive and affective outcomes of design challenges. The video interviews will be continued with other children in our program. The plan is to build a video library rich with anecdotal stories from the children along with video documentation of children engaged in design challenges. I have been inspired seeing firsthand how effective the videos communicate the essence of the children's experiences. I plan to develop a video of myself communicating the essence of design challenges and encourage the use of my guidebook *Save the Gingerbread Man: Understanding & Supporting Creative Thinking Skills in Preschoolers.* The development of the project's resources has enticed me to look into self-publishing. This will first require observing the guidebook's use in "real world" settings. I plan to collect data from ECE instructors and educators before investing into the cost of publishing. In support of these next steps, I will update my biography (Appendix E) on my personal website and the preschool's website. The preschool's website will also be updated to spotlight our ability to understand and support creative thinking skills in preschool age children.

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APPENDICES

Appendix A: Guidebook

Appendix B: Video Interviews

Appendix C: Deck Presentation

Appendix D: College Student Working with Guidebook Prototype

Appendix E: Headshot and Biography

APPENDIX A

GUIDEBOOK

Save the Gingerbread Man: Understanding & Supporting Creative Thinking Skills in Preschoolers.

Select Pages from Save the Gingerbread Man: Understanding & Supporting Creative Thinking Skills in Preschoolers.

SAVE THE GINGERBREAD MAN

UNDERSTANDING & SUPPORTING CREATIVE THINKING SKILLS IN PRESCHOOLERS

HOW TO FACILITATE DESIGN THINKING CHALLEGES TO FOSTER AND GROW CREATIVE THINKING SKILLS: **DESIGN, TEST, FABRICATE, ADAPT, EMPATHIZE, MAKE, FEEL, INVENT, ENGINEER, BUILD, OBSERVE, REFLECT, PLAN, IMPLEMENT, COLLABORATE, CHANGE, COMBINE, ITERATE, PLAY, THINK, ACT, IMAGINE, RESPOND, DREAM, HYPOTHESIZE, AND BELIEVE.**

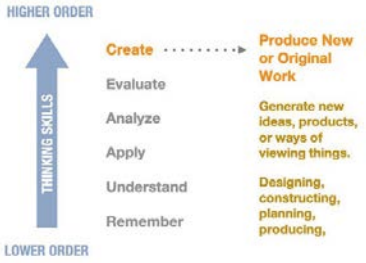
TOM GANNON

TABLE OF CONTENTS

BLOOM'S REVISED TAXONOMY FOR THE 21ST CENTURY

Bloom's Taxonomy (ordinally created by Benjamin Bloom in 1956) is a multi-tiered model for classifying cognitive ability and processes according to complexity. Blooms Taxonomy has been widely used to improve teaching, learning, and identifying educational goals.

The taxonomy was revised in 2001 by Lorin Anderson and David Krathwohl, to reflect what is known about cognition and learning in the 21st century. Bloom's Revised Taxonomy identifies "creating" as the highest order thinking skill (see the graphic below). This implies that to create something new, the lower order thinking skill (evaluate, analyze, apply, understand, and remember) must first put into use. Being creative is the most complex cognitive skill in which humans can engage.



Bloom's Revised Taxonomy for the 21st Century.

CHILDREN NEED CREATIVE THINKING SKILLS – NOT JUST KNOWLEDGE

Our current educational system was developed during the industrial age to create a literate population which could be employed in the new industrial workplace. The information age has given us the ability to access information at the click of a button. The current conceptual age will require people to make unique connections and novel use of information…they will need to be creative thinkers. Children will need to be creative thinkers, flexible, problem solvers, and able to generate innovative ideas (Isbell & Yoshizawa, 2017).

How might you slow a marble rolling down a track? Teachers set up the tracks, and children were provided with tape, a marble, and told they could use any materials in the classroom. Here we see the children testing one of their ideas.

SECTION 3

CREATIVE BEHAVIORS AND HIDDEN BIASES

"Creativity is as important now in education as literacy and we should treat it with the same status."
— Sir Ken Robinson. TED Talk. 2006.

BEHAVIORS OF CREATIVE PEOPLE

You already know... children begin to exhibit a particular temperament within the first few years of life.

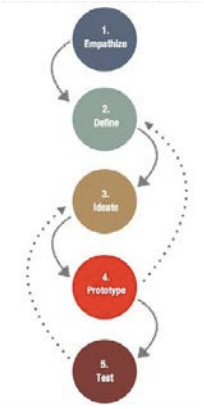
Did you know...there are specific characteristics and behaviors of creativity?

FACILITATING DESIGN CHALLENGES

Here I am telling a story to a group of four- and five-year old children. The story has an empathetic component to set the stage for a design challenge.

So, let's return to creative thinking processes. The process I have been using with preschoolers, for ten years now, is called design thinking. The two main reasons I use design thinking with children is that it is a human centered process (it capitalizes on empathy and helping others), and it utilizes prototyping (building models) and testing as part of the process which really engages children.

Design thinking has five phases (or steps) which dictate what actions, questions, or behaviors are necessary during each phase. Following the process helps produce the best possible outcome. The distinct phases are shown on the next page. The phases are: Empathy, Define, Ideate, Prototype, and Test. Design thinking is an iterative (repetitive) process. It can loop back on itself as new information is uncovered and feedback is incorporated into the participants' thinking and behaviors (Kelley & Kelley, 2013).



The design thinking process is iterative and can loop back on itself when more is learned or discovered.

This view of the design thinking creative problem solving process is what my co-teachers and I use with children at Barron Park Preschool. Let's break it down into manageable parts to help you feel comfortable enough to start engaging with it.

SECTION 6

TYPICAL SUPPLIES FOR DESIGN CHALLENGES

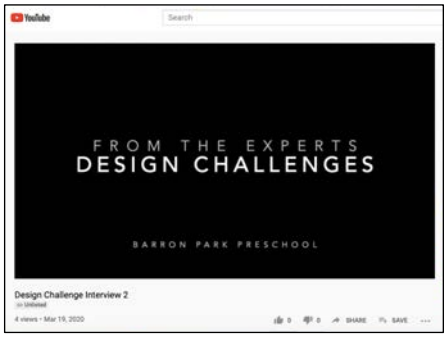
Design challenges should be low- to no-cost and done almost anywhere.

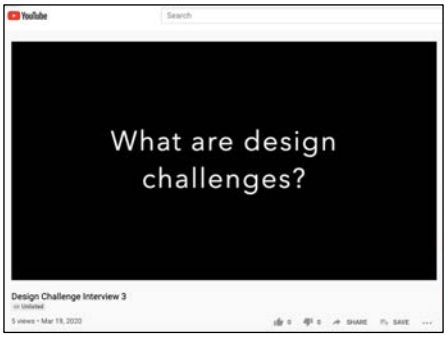
The supplies available during this design challenge were aluminum foil, stir sticks, tape, and a fava bean wrapped with a paper towel.

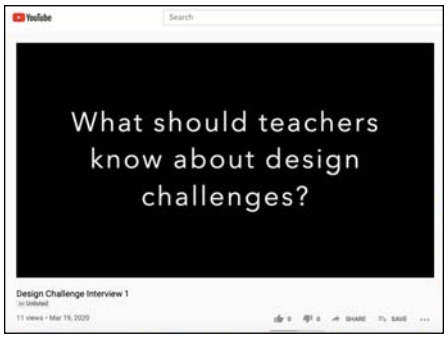
APPENDIX B

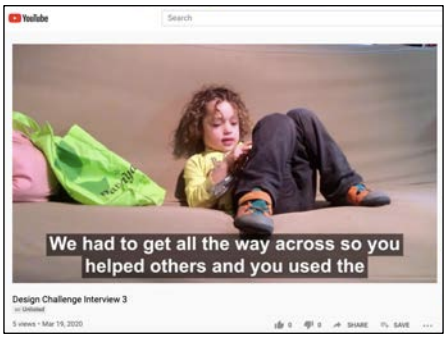
VIDEO INTERVIEWS

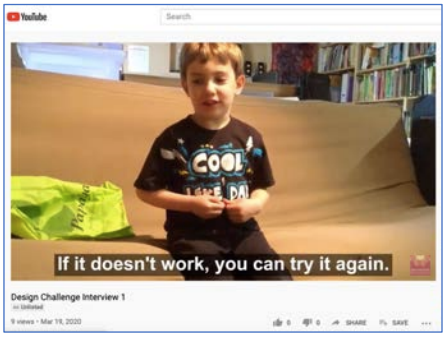
Selected Screen Captures from Video Interviews Uploaded to a Private Playlist on the Barron Park Preschool YouTube Channel

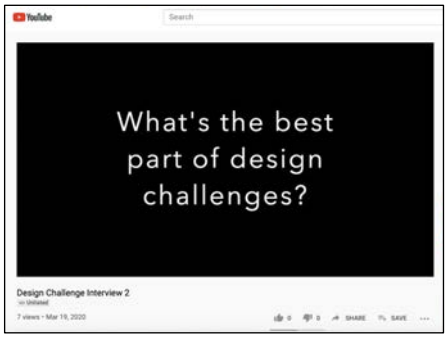


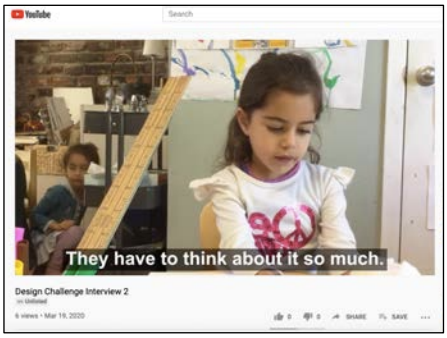












APPENDIX C

DECK PRESENTATION

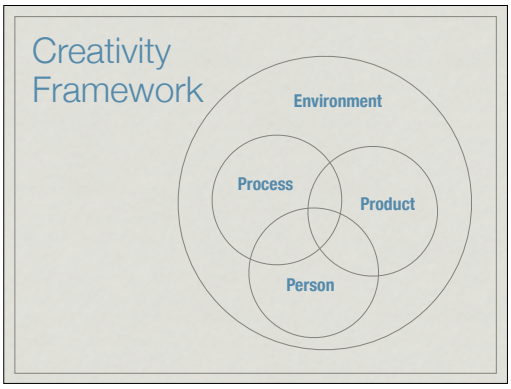
Save the Gingerbread Man: Supporting Creative Thinking Skills in Young Children


SAVE THE GINGERBREAD MAN
SUPPORTING CREATIVE THINKING SKILLS IN YOUNG CHILDREN
TOM GANNON
BARRON PARK PRESCHOOL

1


the struggle
is real.

2


Creativity Framework
Environment
Process
Product
Person

3


Behaviors Check List
Adventurous
Persistent
Imaginative
Cooperative
Feel emotions strongly
Eager to please
Unwilling to accept mere say-so
Competitive
Independent in judgement
Neat and orderly
Asking questions
Compliant
Intuitive
Self-reliant
Sense of humor
Polite
Attempt difficult tasks
Desire excellence
Guessing & hypothesizing
Completes tasks
Willing to take risks
Conforming
Independent in thinking

4


Behaviors Check List
Adventurous
Persistent
Imaginative
Cooperative
Feel emotions strongly
Eager to please
Unwilling to accept mere say-so
Competitive
Independent in judgement
Neat and orderly
Asking questions
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Self-reliant
Sense of humor
Polite
Attempt difficult tasks
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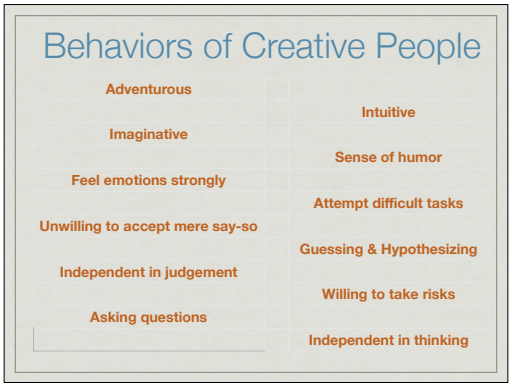
Guessing & Hypothesizing
Completes tasks
Willing to take risks
Conforming
Independent in thinking

5


Behaviors of Creative People
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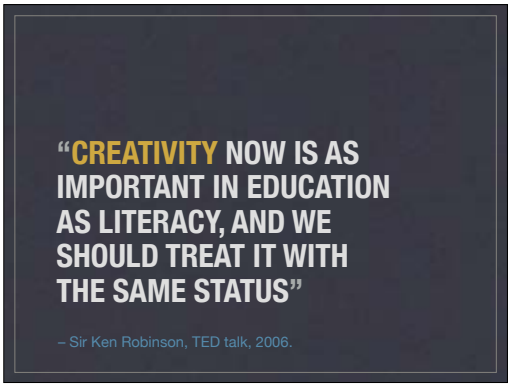
Imaginative
Feel emotions strongly
Unwilling to accept mere say-so
Independent in judgement
Asking questions
Intuitive
Sense of humor
Attempt difficult tasks
Guessing & Hypothesizing
Willing to take risks
Independent in thinking

6


"CREATIVITY NOW IS AS IMPORTANT IN EDUCATION AS LITERACY, AND WE SHOULD TREAT IT WITH THE SAME STATUS"
– Sir Ken Robinson, TED talk, 2006.

7


WHAT IS CREATIVITY
WHY IS CREATIVITY IMPORTANT
HOW CAN TEACHERS SUPPORT CHILDHOOD CREATIVITY
RESOURCES

8

WHAT IS CREATIVITY?

Ability To Produce Something New Through Imaginative Skill, Whether a New Solution to a Problem, a New Method or Device, or a New Artistic Object or Form.

9

10

BLOOM'S TAXONOMY FOR THE 21ST CENTURY

HIGHER ORDER THINKING SKILLS

Create
Evaluate
Analyze
Apply
Understand
Remember

Produce new or original work.

Generate new ideas, products, or ways of viewing things. Designing, constructing, planning, producing, inventing.

LOWER ORDER THINKING SKILLS

11

WHAT IS INNOVATION?

PUTTING CREATIVE IDEAS INTO USE

CREATIVE THINKING SKILLS → CREATIVITY, ORIGINALITY, INITIATIVE → INNOVATION

12

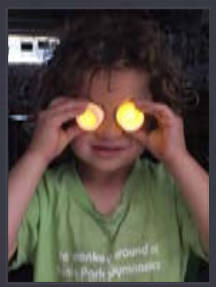
PEOPLE HAVE A PREFERENCES WHEN ENGAGED IN CREATIVE PROBLEM SOLVING

Clarify Ideate Develop Implement

13

14

WHY IS FOSTERING CREATIVITY IMPORTANT… ESPECIALLY FOR 21ST CENTURY LEARNERS?



15

INDUSTRIAL AGE 1760 → INFORMATION AGE 1970 → CONCEPTUAL AGE LATE 1990'S

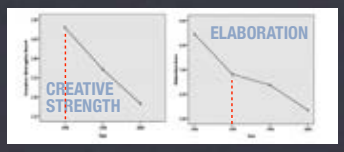
16

WORLD ECONOMIC FORUM
THE FUTURE OF JOBS REPORT

TOP 10 SKILLS IN 2015	TOP 10 SKILLS IN 2020
1. Complex Problem Solving	1. Complex Problem Solving
2. Coordinating with Others	2. Critical Thinking
3. People Management	**3. Creativity**
4. Critical Thinking	4. People Management
5. Negotiation	5. Coordinating with Others
6. Quality Control	6. Emotional Intelligence
7. Service Orientation	7. Judgment and Decision Making
8. Judgment and Decision Making	8. Service Orientations
9. Active Listening	9. Negotiation
10. Creativity	10. Cognitive Flexibility

Source: These are the skills you need if you want to be headhunted. Bloomberg/Businessweek survey of 1,302 MBA recruiters. http://www.bloomberg.com/news/articles/2015-01-05/the-job-skills-that-recruiters-wish-you-had

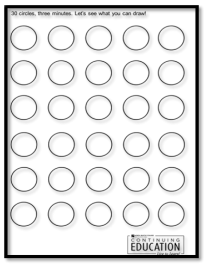
17



18

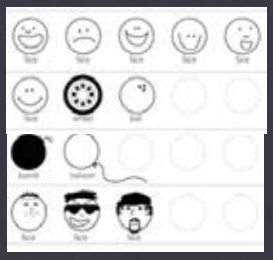
30 CIRCLES GAME

TURN AS MANY OF THE BLANK CIRCLES AS POSSIBLE INTO RECOGNIZABLE OBJECTS IN THREE MINUTES.



19

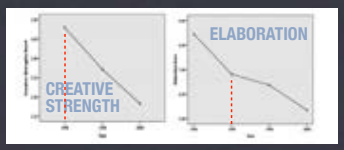
DIVERGENT THINKING IS:



- Fluency
- Flexibility
- Originality
- Elaboration

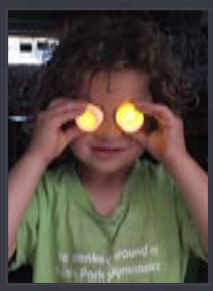
J. P. GUILFORD

20



21

SO…HOW CAN WE SUPPORT CREATIVE THINKING?



22

Grow Your Own Creativity

- Avoid Premature Closure
- Tolerate Complexity
- Tolerate Ambiguity

23

Recognize We Have Two Biases Regarding Creativity:

- We have an "arts bias". We tend to see creativity as an art related endeavor.
- We say we support creativity but we have a bias against children with creative behaviors.

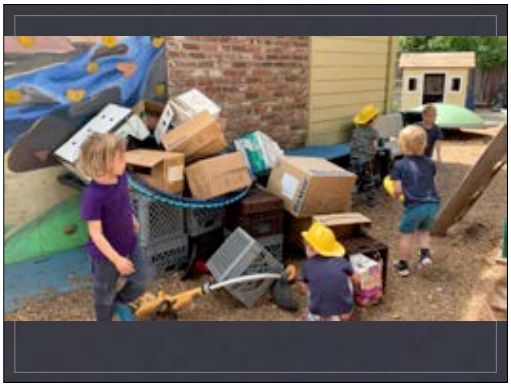
24

25

Behaviors of Creative People

- Adventurous
- Imaginative
- Feel emotions strongly
- Unwilling to accept mere say-so
- Independent in judgement
- Asking questions
- Intuitive
- Sense of humor
- Attempt difficult tasks
- Guessing & Hypothesizing
- Willing to take risks
- Independent in thinking

26



27

Creativity Fostering Behavior of Teachers

1. Delay judging children's ideas until they have been clearly formatted.
2. Take children's suggestions and questions seriously.
3. Help students learn how to cope with frustration and failure, so that they have the courage to try the new and unusual.

28

Teacher Behavior Supporting: **JUDGEMENT**

Delay judging children's ideas until they have been throughly worked out and clearly formatted

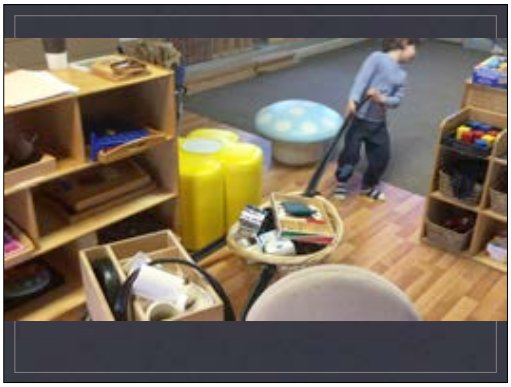
- Have children explore their ideas before providing comment or input.
- Follow up children's suggestions with questions to make them think further.

29

ASK QUESTIONS THAT INVITE CHILDREN TO THINK

Tell me about…
What do you think…
Tell me how you did….
I wonder what would happen if…
What made you decide to…
How do you think you could…
Tell me about the tools you used to do…
Can you think of a different way to…

30



31

Teacher Behavior Supporting: **SUGGESTIONS & QUESTIONS**

Take children's suggestions and questions seriously

- Listen to children's suggestions even if they are not practical or useful
- Follow up on children's suggestions so that they know they are taken seriously

32

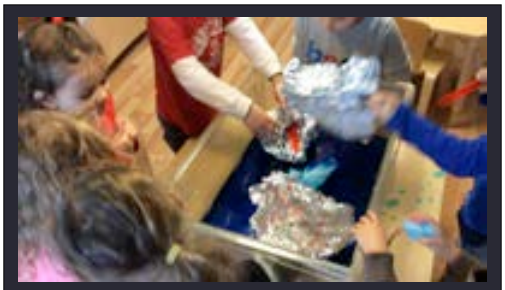
33

Teacher Behavior Supporting: **FRUSTRATION**

Help children to learn to cope with frustration and failure, so that they have the courage to try the new and unusual

- **Encourage children who have frustration to take it as part of the learning process**
- **Encourage children who experience failure to find other possible solutions**

34



Seed Challenge

35

MANIFESTO FOR CHILDREN

BY: E. PAUL TORRANCE

1. Don't be afraid to fall in love with something and pursue it with intensity.
2. Know, understand, take pride in, practice, develop, exploit, and enjoy your greatest strengths.
3. Learn to free yourself from the expectations of others and to walk away from the games them impose on you. Free yourself to play your own game.
4. Find a great teacher or mentor who will help you.
5. Don't waste energy trying to be well-rounded.
6. Do what you love and can do well.
7. Learn the skills of interdependence.

36

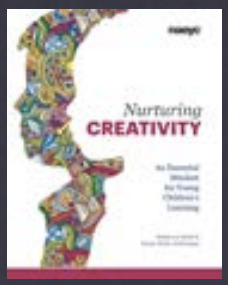
INCREASE YOUR OWN CREATIVITY

BY THE AUTHORS WHO FOUNDED STANFORD'S D.SCHOOL AND IDEO

37

SUPPORT CHILDHOOD CREATIVITY

A WELL RESEARCHED BOOK THAT COVERS KEY CONCEPTS OF CREATIVITY AND CHILDREN



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UNDERSTANDING & SUPPORTING CREATIVE THINKING IN EARLY CHILDHOOD EDUCATIONAL SETTINGS

Tom Gannon
www.BarronParkPreschool.com
Tom@BarronParkPreschool.com

39

Make time to support creativity in yourself and others.

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40

APPENDIX D

COLLEGE STUDENT WORKING WITH GUIDEBOOK PROTOTYPE

This Photo Shows an ECE College Student Providing Support and Encouragement to a Team of Preschool Age Children Building a Prototype During a Design Challenge. The College Student has the Guidebook Prototype in His Hands.

The project included a first year ECE college student interacting with preschoolers during the prototype phase of a design thinking challenge. The college student was provided with background information on the nature and phases of design thinking challenges and provided time to read *Save the Gingerbread Man: Understanding & Supporting Creative Thinking Skills in Preschoolers*. The college student then observed an experienced preschool teacher facilitate the empathize, define, and ideate phases of a design thinking challenge with eleven preschoolers—ages four to five years old. The college student observed the challenge

real time and followed along in the guide book. The college student used the guidebook to assist in prototyping and testing. The objective was to see if the guidebook (a) tracked with the real-world experience, (b) if it communicated clearly and accurately, and (c) helpful for both understanding creative thinking processes and providing confidence to for a preschool teacher to facilitate a design thinking challenge on their own. The college student's feedback was solicited and incorporated into the subsequent iteration of the *Save the Gingerbread Man*.

APPENDIX E

HEADSHOT AND BIOGRAPHY

Tom is a lifelong creativity addict. He has a passion for helping teachers and children foster and develop their creativity and creative thinking skills. His personal creativity includes: creative thinking, design thinking, playing the guitar, ukulele, and electric bass, graphic design, cooking, woodworking, and process improvement. Tom is the administrator and master teacher at Barron Park Preschool, a play-based emergent curriculum preschool in Palo Alto, CA. His influence on early childhood education includes the use of design thinking, fostering growth mindsets, and creative self-efficacy. He has presented and co-presented on creativity for both the National Association for the Education of Young Children (NAEYC) and the California Association for the Education of Young Children (CAAEYC), and other early learning organizations. He facilitates hands-on workshops for teachers wanting to learn how to foster creative thinking in their classrooms. Tom's life experiences include being a marketing director, busboy, graphic designer, general manager, sales representative, paperboy, ice cream scooper, and customer service manager. Tom is a life-long learner who completed his master's certificate in creativity in 2019. He is currently enrolled in the Creativity and Change Leadership master's program at Buffalo State in New York and will graduate with a master of science in 2020.

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Permission to Place this Project in the Digital Commons Online

I hereby grant permission to the International Center for Studies in Creativity at Buffalo State college to place a digital copy of this master's project *Fostering Creative Thinking Skills in Young Children Using Design Thinking Challenges* as an online resource.

Tom R. Gannon

April 14, 2020

Date