We Teach Who We Are:
Creativity in the Lives and Practices of Accomplished Teachers

Brief description of article:
How do exemplary teachers incorporate creativity in their teaching? Through in-depth interviews with National Teacher of the Year award winners, this research aims to better understand their beliefs, interests, and practices involving creative teaching. Results identify key themes of how these teachers approach the creative process, as well as the connection between their personal interests and professional creativity.

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Henriksen, D., Mishra, P., & the Deep-Play Research Group. (2014). Twisting knobs and connecting things: Rethinking Technology & Creativity in the 21st Century. *Tech Trends*, (58)1, P. 15-19
Henriksen, D., & Mishra, P. (2013). Learning from creative teachers. *Educational Leadership.* 70(5). Retrieved from http://www.ascd.org/publications/educational-leadership/feb13/vol70/num05/Learning-from-Creative-Teachers.aspx

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Kereluik, K., Mishra, P., Fahnoe, C., & Terry, L. (2013). What knowledge is of most worth: Teacher knowledge for 21st century learning. *Journal of Digital Learning in Teacher Education,* 29(4), 127-140.
Koehler, M. J., Mishra, P., Kereluik, K., Shin, T.S., & Graham, C. (2013). The Technological Pedagogical Content Knowledge Framework. in M. J. Spector, M. D. Merrill, J. Elen, & M. J. Bishop (Eds.) *Handbook of Research on Educational Communications and Technology*. Fourth Edition. Springer, NY. p. 101-111.

Abstract

Background/Context:

There is a strong sense in education that creativity should be nurtured in classroom settings, yet there is little understanding of how effective and creative teachers function (Cropley, 2003; Robinson, 2011; Sawyer, 2011). Existing research has recognized that successful/creative people in any discipline use creative avocations to enhance their professional thinking (Simonton, 2000; Feinstein, 2006). Root-Bernstein (1996; 1999) demonstrated a strong connection between the professional and personal-life creativity of highly accomplished scientists, which has been applied to other disciplines. Until now, however, this phenomenon has not been applied to exemplary teachers. This study focuses on a broader picture of how exceptional teachers use creativity in the classroom.

Purpose/Objective/Research Question/Focus of the Study:

This study documents the ways in which successful, award-winning teachers function creatively in their classrooms. It investigates their beliefs about creativity in teaching - what "creativity" means, and how skilled teachers instantiate it in classroom practices. Finally, this research examined the teachers' personal creativity (in terms of creative pursuits, hobbies, and habits of mind) and the practical ways this translates into teaching.

Research Design:

A qualitative research design was used, for in-depth interviews with highly accomplished teachers. Detailed interview data was gathered from eight recent National Teacher of the Year award winners/finalists, to investigate creative classroom practices and beliefs about creativity among exceptional teachers across varied teaching contexts. Qualitative coding of

phenomenological research described important themes arising from the creative practices and beliefs of the participant teachers.

Findings

Findings reveal how excellent teachers actively cultivate a creative mindset. Results show how excellent teachers are highly creative in their personal and professional lives, and that they actively transfer creative tendencies from their outside avocations/interests into their teaching practices. This study describes common themes in creative teaching, including: intellectual risk taking, real world learning approaches, and cross-disciplinary teaching practices.

Conclusions/Recommendations:

Current U.S. educational policy, with its emphasis on high-stakes testing and scripted, "teacher-proof" curricula, have impeded creativity in teaching and learning. Based on the findings of this study, suggestions for curricula include the incorporation of teachers' unique personal creative interests in lessons, along with infusion of the arts and music across varied disciplinary content. Teacher education programs and professional development courses should include a focus on both real world cross-disciplinary lesson planning, while administrators and policy makers should support opportunities for teachers to take creative and/or intellectual risks in their work.

Executive Summary

Creativity in Education

In recent years, U.S. educational policy has been geared towards high-stakes, standards-based teaching and assessment, which has presented a significant challenge to creativity in teaching (Giroux & Schmidt, 2004; Robinson, 2011). At the same time that creativity has been squeezed out at the policy level, it has become a subject of heightened interest in the field of education (Plucker, Beghetto, and Dow, 2004), and there is a recognized need to develop critical and creative thinkers for the 21st century (Cropley, 2003; Robinson, 2011; Sawyer, 2011).

Sternberg & Lubart (1996) have noted that creativity is a trait highly associated with social, emotional, cognitive and professional advantages in life. Within the field of education there is a general agreement as to the relevance and importance of creativity in teaching (Amabile, 1996a; Sternberg, 1999; Cropley, 2003; Sawyer, 2011; Williams, 2001). Yet, there has also been a relative lack of studies around creative teaching, and there is a definitive need to better understand how creative teachers think, work and function in the classroom (Sawyer, 2011).

The importance of creativity has vital roots in the field of teaching. Dewey (1916; 1934) suggested that the arts and creativity are connected to all domains of human knowledge – first and foremost to teaching and learning. Amabile (1996a) suggested that many important factors influencing a person's creative development are found in the classroom. Renzulli (1992) noted that teachers, as mentors and role models, are principal constituents in developing student creativity.

Jeffrey & Craft (2004) highlighted the need for further research into better understanding of creative teaching, learning and classroom creativity. While many government initiatives globally have pointed to the need for fostering creativity in education, there is still much need for discussion and initiatives focused on pedagogical strategies for fostering creativity (Craft, 2005; Lin, 2011).

Understanding Creativity

There has been a general uncertainty about how we define creativity in general (Sternberg & Kaufman, 2002), and what is means in teaching. Theorists and researchers alike have found it difficult to concretely define the term (Friedel & Rudd, 2005; Marksberry, 1963; Sternberg, 1999). Sternberg & O'Hara's widely used definition suggests that creativity lies in the ability to create ideas or works that are "novel, high in quality, and task appropriate" (p. 255).

Even beyond this definitional question, there is the problem of understanding how creative ideas come about. Simonton (2000; 2003) has asserted that creativity arises from a mind that possesses an array of intellectual, cultural, and aesthetic interests. Similarly, Harrington (1990) viewed creativity as arising from a range of influences surrounding a person, and described creativity from an "ecological perspective". Gruber's (1988) work suggests that creativity as a sustained act, a way of thinking, living and being, and relate to the combinatorial notion of a "prepared mind".

Along these lines, Root-Bernstein (1996; 2003) showed a strong correlation between personal creative interests and professional abilities/accomplishment in the area of science. In a 1996 study (which included a mix of scientists, including several Nobel Laureates), Root-Bernstein demonstrated that the most successful and innovative scientists often engaged in a wide variety of avocations (artistic, musical, different subject matter interests, athletics, etc.) to

enhance their professional accomplishment. Until now, this framework had not yet been applied to creative teachers.

Thus, this study investigated a series of issues such as: what creativity means to successful teachers; what they believe about it and how they incorporate it in classroom practices; and the relationship they see between their personal interests and professional creativity.

Methods

A qualitative research design was used for semi-structured interviews, with a flexible interview protocol created to guide the interviews. This study used a purposeful sampling approach with participants who could best speak to issues of creativity among accomplished, successful teachers. This included teachers who had recently won or been a finalist for the National Teacher of the Year award. Long interviews (approximately 90 minutes each) with eight award-winning teachers provided rich, descriptive qualitative data on creativity in the lives, beliefs, and practices of accomplished teachers. As recommended by Creswell (1998), the interviews were audiotaped with informed consent from each interviewee, and were professionally transcribed prior to data analysis.

Coding the data revealed patterns and themes to bring meaning, order and structure to the textual analysis. HyperResearch© (Lewins and Silver, 2010), a qualitative data coding software, facilitated the process and management of textual data and coding schemas. Using this software, three separate iterations of coding were conducted, scaling down to a final set of codes, or themes, with the most significant themes discussed in the following findings and conclusions. Creswell (1998) recommends employing at least two out of eight verification techniques. This study used three such techniques: peer-review or debriefing, member checks, and rich thick

description (through use of detail and direct quoting), as well as the use of a secondary coder, which resulted in inter-coder reliability of 76%.

Findings

In line with the Sternberg & O'Hara (1999) view of creativity as being novel, high-quality, and task appropriate, the teachers in this study defined creativity in ways that both align with traditional (novel and effective) definitions of creativity, but also include more contextual, teacher-specific considerations (the "task appropriate" component). A "creative mindset" was noted as important for teaching, including "openness" for trying new things, and for connecting between different things. This mindset involves a certain amount of cross-pollinating of knowledge occurs, in using new ideas from other disciplines or experiences for teaching practices.

The teachers described how they implement creative approaches in their classrooms in ways that cluster around three core themes: *real world learning*, *cross-curricular connections*, and a *willing to take intellectual risks*. These themes emerged organically through the interviews and were supported by multiple examples from their lessons and practices. In addition to exemplifying and describing these themes in classroom practices, we describe the themes as possibly providing a framework for thinking about teacher creativity. Creativity research in psychology has already shown that themes such as intellectual risk taking and cross-disciplinary thinking are central to creative thought (Amabile, 1996b; Root-Bernstein, 2003). Because real world learning was a new and emergent theme with respect to creativity, we provide some discussion of how these three themes hang together as part of a coherent structure and integrated profile of creative teaching.

This study suggested that outside pursuits factor into how creative teachers think about their classrooms, because teachers tend to "teach who they are". They see connections between their own interests in anything from rap music to cooking or travel, to school subject matters like math or language arts, and find interesting ways to teach and develop creative lessons out of these. Six out of the eight teachers had substantive interests in the arts and/or music, and six out of the eight had significant kinesthetic interests (yoga, rock climbing, surfing, etc.) More notably, they all discussed and exemplified how these interests are integral to their teaching practices.

Conclusions

The findings of this study have significant implications for teacher education and policy. For instance, at the local school-level, supportive administrators can make a valuable impact through encouraging teacher creativity. At a broader level, incorporating more creative approaches into education policy and curricula (as opposed to test-driven or drill-oriented approaches) could infuse the system with the excellence and creativity recognized in individual educators. It may also be beneficial to offer professional development around some of these themes of creative teaching, (real world learning opportunities, interdisciplinary approaches, and infusion of personal creativity into teaching).

Helping pre-service, and in-service, teachers exercise their personal creativity in teacher education programs and professional development could prepare teachers to think of themselves as creative teachers. Courses that bridge between creative hobbies and interests and teaching practices, lessons and activities may be important. Giving pre-service teachers more opportunities for inter-disciplinary lessons, and art/design or music-based lesson planning, is also a step toward more creative teaching practices.

Creativity has become a subject of intense interest in education. This qualitative study offers a deeper understanding of some of the elements (both personal and professional) that go into creative teaching. Clearly authentic, artistic, aesthetic, cross-curricular, open-minded, and risk-taking approaches, as exemplified by these award winning teachers, can serve the field of teaching and research into the future.

Introduction

Over the past several decades, creativity has become a subject of heightened interest to the field of teaching (Plucker, Beghetto, and Dow, 2004). As a trait, it is associated with social, emotional, cognitive and professional advantages in life (Sternberg & Lubart, 1996; Sternberg, 2006), and is considered to be one of the most highly coveted qualities of thinking (Lewis, 2008). There is a strong, and generally agreed-upon recognition of the necessity of creativity in teaching (Amabile, 1996a; Sternberg, 1999; Cropley, 2003; Sawyer, 2011), and that creativity should be nurtured and supported in educational environments (Williams, 2002). However, there has also been a comparative lack of studies (in relation to other areas of educational research) around creative teaching, that seek to better understand how creative teachers think, work and function in the classroom, and how these concepts can serve other classrooms and teachers going forward (Sawyer, 2011).

There is a definitive need to understand how successful teachers operate creatively, in their lives and their classroom practices. Studying creativity, however, is complicated by its abstract and complex nature, and the fact that there is not one consistent definition of "what creativity is" or what it means for effective teaching (Baker, Rudd, & Pomeroy, 2001; Friedel & Rudd, 2005; Marksberry, 1963; Sternberg, 1999). The recent and current state of U.S. educational policy, which has been heavily slated toward high-stakes, standards-based assessment has also been a major challenge to the study of creativity in teaching (Giroux & Schmidt, 2004; Robinson, 2011). Yet the importance of creativity and the need to develop critical and creative thinkers in the 21st century cannot be denied, and with that comes a requisite

need for research on successful creative teaching practices (Cropley, 2003; Robinson, 2011; Sawyer, 2011).

Given this lack of uniform understanding, one goal of this research study was to better understand how creative teachers conceptualize and define creativity. Moreover, we sought to investigate how their beliefs about creativity influence their classroom practice.

A key issue in creativity research has been that of identifying where and how creative ideas arise (Simonton, 2004; Kandel, 2012). One line of research shows that creative people are enriched by their personal avocations and pursuits, which contribute to their creativity and thinking in their professional discipline (Root-Bernstein, 1996, 1999; 2001). In the domain of science, Root-Bernstein (1996) demonstrated that accomplished and successful scientists tend to have creative passions and personal interests in fields outside of their field of expertise. More importantly, these scientists frequently credit their interests and avocations with influencing their professional accomplishment. While this focus on personal creativity has provided a useful framework for considering creative thinking and innovation across many disciplines, similar tendencies have not yet been studied among highly successful and accomplished teachers.

Therefore, an additional goal of this study was to explore the connection between personal and professional creativity in teaching – and to consider where or how successful teachers get their creative ideas.

In order to investigate these complex and open-ended issues fully, in-depth interviews were conducted with teachers deemed to be successful or "highly accomplished" in the profession. For this study, this was defined as teachers who had either received, or been one of a few national finalists for, the National Teacher of the Year award. This award singles out excellence and exceptional practices in teaching overall, and the award winners/finalists are

frequently noted for their creativity (as we describe in more detail later). These teachers provided an excellent opportunity to consider their beliefs about creativity, how it is a part of their lives and thinking, and how their avocations and personal-life creativity inspires creativity in teaching.

The Case for Creativity in Teaching

The importance of creativity has deep and vital roots in the field of teaching. Dewey (1934) suggested that the arts and creativity are connected to all domains of human knowledge, perhaps first and foremost to teaching and learning (Dewey, 1916; 1934). Amabile (1996a) noted that when all aspects that influence the development of a person's creativity are considered, many important factors can be found in the classroom, and that teacher characteristics and behavior were significantly relevant. Additional research has shown that teachers, as mentors and role models, are principal constituents in developing student creativity (Renzulli, 1992). Karnes et al. (1961) suggested that creativity is related to educational achievement, and that the teachers who motivate creativity in their students also modeled creative or divergent thinking themselves.

Further highlighting the efficacy of creative teachers, some researchers have suggested that the study of creative teaching is essentially the same as the study of "teacher effectiveness" (Esquivel, 1995). In fact, there is a strong body of thinking in educational research, which essentially equates effective teaching with creative teaching (Anderson, 2002; Bain, 2004; Bleedron, 2003, 2005; Chambers, 1973; Davidovitch & Milgram, 2006; Esquivel, 1995; Milgram, 1979; Renzulli, 1992; Torrance, 1981; 1995). Others have noted that creative teachers are energetic and knowledgeable, with a supportive, flexible, distinctive manner (Lilly & Bramwell-Rejskind, 2004).

Along these lines, Jeffrey & Craft (2004) highlighted the need for further research into better understanding of creative teaching and learning. Lin (2011) stressed the need for more research into strategies and insights for creativity in the classroom. While many government initiatives globally have increasingly emphasized the need to foster creativity in education, there is little discussion in such initiatives about pedagogical strategies to adopt for fostering creativity (Craft, 2005; Lin, 2011).

The need for creativity in teaching and learning settings has become notably more apparent in recent years. Creative thought processes are considered to be necessary as criteria for accomplishment in an increasingly complex and interdependent society (Florida, 2002; Pink, 2005; Robinson, 2003; 2011). Diverse knowledge bases and multifaceted issues demand creative thinkers and innovative problem solvers from K-12 and beyond (Zhao, 2012). As the ability to adapt, improve and grow relies on innovation and new construction, creative thinkers are often highly successful throughout life and across disciplines (Cropley, 2003; Sternberg, 2006; Subotnik, Olszewski-Kubilius, & Worrell, 2011). Pink (2005) describes the significance of creative abilities in modern society:

> Today, the defining skills of the previous era—the 'left brain' capabilities that powered the Information Age—are necessary but no longer sufficient. And the capabilities we once disdained or thought frivolous—the "right brain" qualities of inventiveness, empathy, joyfulness, and meaning—increasingly will determine who flourishes and who flounders. (p. 3)

Much educational research on creativity emphasizes possibilities for increasing student creativity. But given the central role that creative teachers have in influencing student thinking and learning, more research is needed to understand teacher creativity (Sawyer, 2011).

Generally, there has been a clear consensus view in educational research that creativity is valuable to teaching, yet there has been an increasingly need for research that explicates how creative teachers think, work and conduct their classroom practices (Amabile, 1996a; Baer & Kaufman, 2006; Craft, 2000; Cropley, 2003; Kaufman & Beghetto, 2009; Puccio & Gonzalez, 2004; Runco & Chand, 1995; Shaheen, 2010; Wilson, 2005).

The challenge of defining creativity

Despite this emphasis on creativity and its significance in teaching, there are few research measures to assess and analyze creative teachers. Goodson (1992), suggested that studying creative teachers' lives via research measures such as interviews can provide awareness of how creative teachers function. The technique of "simply asking the subject" becomes increasingly important, when one considers the complexity and diffusion among definitions of creativity. Despite its historical basis as a concept, and extensive research in recent years, theorists and researchers alike have found it difficult to concretely define creativity (Baker et al., 2001; Friedel & Rudd, 2005; Marksberry, 1963; Sternberg, 1999).

In describing the key roadblocks faced by the study of creativity, Sternberg and Kaufman (2002) have pointed to, "problems with the definition and criteria for creativity that seem to render the phenomenon either elusive or trivial." (p. 4) They further note that we must go beyond psychometrics, and beyond the general classic definition of novel and useful. As they state, "an important challenge for the next 50 years of creativity research is to develop a clearer definition of creativity, and to use a combination of research methodologies that will move the field from speculation to specification." (Sternberg & Kaufman, p. 459). Along the same lines, Koehler & Mishra (2008) emphasized the problem of a lack of a common definition for creativity, and the difficulty of constructing one. They also acknowledge that if we are to focus on creativity in the

field of education, there needs to be a "more rigorous articulation of it" (p. 11). In essence, this pre-figures the first research question of the study, as it pertains to education and teaching: *What do successful teachers believe about creativity, and how do they define it?*

Though creativity can be seen as a fuzzy construct, the field has, at a general level, described it as the production of useful solutions to problems, or novel and interesting ideas across domains, which create products and/or artifacts and impact thinking (Amabile, 1988, 1996a; Oldham & Cummings, 1996; Zhou & George, 2001).

As such, many definitions assert at least the two common factors of novelty (newness, originality, freshness, uniqueness, etc.) and effectiveness (value, usefulness, quality, etc.) in defining creativity. Creative work is novel in that it brings something into the world that did not exist before (at least in that particular/specific instantiation). But novelty alone does not define creativity – novelty must be joined to the value, quality, or usefulness of the work. A novel idea with no potential use cannot be taken as "creative" (Cropley, 2003); it must also have value, quality, or be effective towards a purpose (Zhou & George, 2001).

Sternberg and O'Hara (1999) suggested adding another layer to this definition, "task appropriateness", to account for the importance of context in creative work. Thus, the core component of creativity lies in the ability to create ideas or works that are "novel, high in quality, and task appropriate" (p. 255). Sternberg & O'Hara's definition upholds the core components of the novelty and quality of the work, but also suggests that creative products (ideas, artifacts etc.) are sensitive to context, and must be valued based on the domain they were created within – their "task appropriateness" or contextuality. For instance, a creatively constructed mathematical proof, or beautiful piece of artwork, will look incredibly different from each other. And furthermore these look different from any number of creative acts in disciplines ranging from

music, to science, or teaching, and others (Mishra, Henriksen, & the Deep-Play Research Group, 2012). Mishra and Koehler (2008) describe this sensibility of context as "wholeness" – which, along with the elements of novel and effective, is what they termed a NEW (novel, effective, whole) definition of creativity (Mishra, Henriksen, & the Deep-Play Research Group, 2013). So, a comprehensive definition of creativity must also account for context.

Moving beyond beliefs, ideas, and other abstractions toward a more concrete understanding of creativity in education, the field of education requires a clearer picture of creative teaching. Teaching is a complex domain, and we need actual examples of *how* creativity is instantiated. This pre-figures the second question of this study: *How is creativity instantiated in successful teaching? In what ways is it actualized in the classrooms and teaching practices of accomplished, successful teachers?*

Personal Creativity and Professional Accomplishment

Csikszentmihalyi (1996) and Gardner (1993) refer to creativity, in any profession, as being either "little c" or "Big C" in nature. In essence they distinguish "little c", or everyday, subtler, smaller acts of creativity from "Big C", or more grandiose, "sublime" creativity. Big C creativity may involve "extreme forms of originality" that dramatically shifts thinking within a discipline, yet subtler kinds of little c (everyday) creativity may be just as crucial to improvement or innovation within a discipline. Kaufman & Beghetto (2009) expand this further into a "four c" model of creativity, to include *Pro-c* and *mini-c* creativity. Mini-c describes the creative insights experienced by the students, to "encompass the creativity inherent in the learning process". Pro-c refers to professional creativity that has not yet had a historical impact (Kaufman & Beghetto, 2009, p.3).

Sternberg (2006) recounts that, "Creativity is as much a decision about and an attitude

toward life as it is a matter of ability" (p. 93). This suggests a "rounded" view of creative people, i.e. creative people would approach matters creatively even in areas outside their expertise. In recent years, creativity has been suggested to have a "combinatorial" nature. This refers to the way creative thinking requires diverse knowledge bases, interests, and experiences, from which a person draws inspiration. Combinatorial creativity involves a mindset that thinks across different disciplines and experiences, in order to connect ideas for new inspiration and construction (Hofstadter, 1995; Henriksen, Mishra, & the Deep-Play Research Group, 2014; Root-Bernstein, 1999; Simonton, 2004; Eagleman, 2011). This view on creativity suggests that the crux of combinatorial creation (the process of ideas coming together to "make a stable combination") must be organic and unforced.

Howard Gruber's studies of creativity (demonstrated in his prominent and formative psychological case studies of Darwin and Piaget) offer some insight into the notion of creativity as a sustained act, a way of thinking, living and being, and relate to the combinatorial notion of a "prepared mind". Gruber's (1988) work suggests that even creative work that appears mysterious or serendipitous is actually quite purposeful in ways not readily apparent to the casual observer (Lavery, 1993). Valuable insights and original discoveries arise from a prepared mind, a "welcoming mind belonging to one who has prepared it by his own efforts, as a field in which new ideas can flower" (Gruber & Barrett, 1974, p. 246, 248). Creative work is not characterized by "Eureka!" moments. As Gruber notes "the sudden insight in which a problem is solved…may represent only a minor nodal point, like the crest of a wave, in a long and very slow process – the development of a point of view" (Gruber & Barrett, 1974, p. 5).

Simonton (1991; 2000; 2003) also has asserted that creativity, while it varies across domains, comes from a mind that possesses an impressive array of intellectual, cultural, and

aesthetic interests, and that such depth and variety of interests provides content to make comparisons and draw analogies. In any discipline, whether it is music or mathematics or science, this content knowledge provides them with resources, similar to the materials an artist would use to create a piece of work. Simonton (2000; 2003; 2004) further suggests that creative people have an open mind toward novel, complex, and ambiguous stimuli in their surroundings, because this expands trains of thought into unexpected corners of experience.

Harrington (1990) viewed creativity as arising from a range of influences surrounding a person, and thus described creativity from an "ecological perspective". The different social, psychological, environmental, and other variables, deconstruct the myth of the "lone genius", and shows creativity as arising within a dynamic and complex context of influences (Harrington, 1990).

This returns us to the combinatorial notion of a mind prepared by a range of experiences over time. We can optimize our minds for combinatorial creativity. Creative or innovative people do this naturally, by enriching their mental pool of resources with diverse, eclectic, cross-disciplinary interests, knowledge and experiences, which to fuse together into new combinations (Henriksen, et al., 2014; Mishra, Henriksen, & the Deep-Play Research Group, 2014; Popova, 2012).

Feinstein (2006) has looked at the development of creativity across a wide variety of contexts and individuals, drawing on a remarkable set of examples that show how creativity develops and manifests. He suggests that individuals' creative interests are central to their creative accomplishments. There are different pathways through which individuals may pursue and develop their personal interests creatively, but most importantly they use these to generate ideas, insights, and projects, leading to professional contributions or innovations. This also

involves the linking together of seemingly disparate interests towards a creative result, generating creative ideas in a very inter-disciplinary manner (Feinstein, 2006).

Along these lines, Root-Bernstein (1996; 2003) showed a strong correlation between personal creative interests and professional abilities/accomplishment in the area of science. In a 1996 study, Root-Bernstein (1996; 1999) demonstrated that the most successful and innovative scientists often engaged in a wide variety of avocations (artistic, musical, different subject matter interests, athletics, etc.), which they felt had enhanced their professional accomplishment. In Root-Bernstein's study of forty scientists (including four Nobel Laureates), participants were initially surveyed and interviewed with regard to their attitudes toward creativity, and creative pursuits, hobbies, avocations, etc. The degree to which the scientists had met with different levels of professional creativity and accomplishment was compared to the data on their creative inclinations and tendencies in their outside lives. Significant correlations were established between scientific accomplishment/innovation and personal creative tendencies – valuing creativity in their outside lives, or varied interests in a range of subjects and topics.

While this connection between avocations and professional creativity has been investigated among successful scientists, artists, and other disciplines, the concept has not yet been applied to teachers. One of the key issues of how creativity functions in the field of teaching is grasping where and how creative teachers get their ideas. Root-Bernstein (2003) notes profuse examples of exceptional professionals in art or science who succeed by transferring ideas between domains. Physicist Max Planck noted, "The scientist needs an artistically creative imagination". And the musical composer Stravinsky believed, "The way composers think – the way I think – is not very different from mathematical thinking". Or as Pythagoras stated, "we are poets…" – suggesting the role of mathematicians as a creative one.

As suggested by the work of Root-Bernstein (1996), connections between creative avocations and professional accomplishment may exist for exceptional teachers as well. This suggests a need to investigate the phenomenon among successful teachers, leading us to the third main research issue of this study: *Does the personal creativity of successful teachers impact their professional teaching creativity, and if so, how? What kinds of creative interests and avocations do they pursue, and how do these things influence and connect to their teaching practices?*

Methods

This study explored creativity in the beliefs and practices of successful teachers, and considered the connection between personal and professional creativity in their teaching practices, through in-depth interviews with accomplished successful teachers. A qualitative research design centered on semi-structured interviews (supplemented incidentally by data collected on participants from additional sources and documents).

Instrumentation

Due to its divergent nature, creativity is frequently noted in research and literature as a difficult subject of research, whether through quantitative or qualitative methods (Klein, 1982; Plucker, et al., 2004). Hocevar (1981) suggested, "A useful way to measure creativity is to simply ask the subject. This is not a profound position, but yet the procedure is rarely used" (p.459). The interview process and instrumentation used in this study did this, by collecting data from the subjects regarding their own ideas on, and experience of, creativity in their beliefs, lives and teaching practices. A semi-structured interview protocol was created to guide the interviews with a flexible structure, and hone in on the research questions of the study (involving successful

teachers' beliefs and ideas on creativity, how it's instantiated in their teaching, and how their personal creativity/avocations/interests play a role).

Each question in this protocol was linked to one or more of the three broader research questions of the study and cross-referenced as shown in Table 1 (attached at the end of this document). The full protocol, which lists all interview questions cross-referenced here, can be found at the end of this article in Appendix A.

Table 1 (attached on separate sheet)

There were several broad categories of questions, starting with those intended to investigate beliefs about creativity (i.e. how do you define creativity? Is it important in a teaching practice? etc.). These were followed by questions aimed at understanding what creative teachers do in the classroom (i.e. examples of how creativity is instantiated in their lessons, teaching practices, etc.). Finally, there were questions aimed at investigating if and how personal life creativity is part of their successful teaching practices (i.e. what kinds of outside interests or creative avocations do they do, and do these bleed over into their teaching work?).

Sample

This study used a purposeful sampling approach with participants who could best speak to issues of creativity among accomplished, successful teachers. A specific sample of selected individuals allowed for participants who could provide detailed information and enough data in interviews to paint a rich picture of creativity among skilled teachers. Both Patton (2002), and Creswell (1998) advocate this approach, to ensure that all participants actually have experienced the phenomena or concepts of interest. To address its research questions, this study required participants who could be defined as "effective", "accomplished", and "creative" teachers.

Given this, the participants selected for this study were teachers who have received or been finalists for the National Teacher of the Year (NTOTY) award.

Of course it is not immediately evident that winners of these awards are necessarily creative teachers. We describe below in greater detail a range of reasons why this select group of teachers can indeed be considered as being highly creative.

First, The NTOTY awards recognize excellence and "effectiveness" in teaching. One teacher per state, every year, is selected based on criteria that invariably should reflect "effective" teaching. For example, the State of Michigan website notes their criteria, among others, as, "exceptionally dedicated, knowledgeable and skilled", "inspires students" and "acts as a role model for innovation" (per the Michigan Department of Education Website, Teacher of the Year Program Guidelines). While criterion varies slightly by state, they are generally similar, and are kept broad to allow for a scope of different types of teachers. The selection processes for all states however, are rigorous and consistent. Applicants must show: 1) a clear record of substantial positive classroom outcomes and student learning (i.e. a verifiable track record of teaching results); 2) examples of original, effective teaching; 3) high recommendations (in written form) from peers, principals, students, and parents. Winners are vetted and selected by a state education panel, as the best in the field in teaching accomplishment. Among the 50 state-level Teacher of the Year award winners every year, only four are selected to be finalists for the National Teacher of the Year award. From these four national finalists, one is selected to receive the award for the entire U.S. These criteria indicate that "Teacher of the Year" (TOTY) award winners can be considered as being "effective" teachers.

Given that these teachers are effective teachers, the question remains whether effective teachers can or should be considered as being creative? On this issue, there is a body of

educational research which considers "effective teaching" to essentially be the same as "creative teaching" (Anderson, 2002; Bain, 2004; Bleedron, 2003, 2005; Chambers, 1973; Cropley, 1967, 2001; Davidovitch & Milgram, 2006; Esquivel, 1995; Fasko, 2000-01; Milgram, 1979; Newcomb, McKracken and Warmbrod, 1993; Renzulli, 1992; Torrance, 1981, 1995). In fact, it has been suggested that "creative teaching" can be subsumed under the heading of "effective teaching" (Esquivel, 1995). Within these parameters, it was reasonable to consider the TOTY award winners and finalists as being creative as well.

In addition, support for selecting these teachers comes from a review of their individual applications, portfolios for evidence of creative teaching. This review was conducted for fifteen of the recent national TOTY finalists from data available online. Application data for the four national finalists (of recent years) is available on the National Teacher of the Year website. This includes information such as teaching philosophy statements, lesson examples, etc., for these award-winning teachers. Upon reviewing information from fifteen of the recent National Teacher of the Year award finalists, there was clear evidence of "creativity", both implicitly (examples of creative teaching) and explicitly (specific mentions of "creativity" in teaching philosophy, etc.). All but one of the 15 teachers made clear, specific references to "creativity", in their stated comments about their own teaching. All fifteen provided examples of classroom teaching or lessons which can be construed as "creative", in that they were original and innovative as well as valuable in the classroom (i.e. unique but effective examples of teaching). So, overall 14 of the 15 teachers explicitly referenced creativity or creative teaching, and all 15 of them provided implicit examples of creative teaching. This makes it reasonable to assume that National Teacher of the Year finalists/winners could be considered representative of "effective" and "creative" teachers.

An initial sample size of approximately 5-10 interviewees was deemed appropriate for in-depth interviews. This is supported by common standards of qualitative research design, as Creswell (1998, p.65) suggests "long interviews, with up to 10 people" are valuable for descriptive study. This allows information-rich data, targeted to specific participants on the topic.

Long interviews (approximately 90 minutes each) with eight award-winning teachers provided rich and descriptive qualitative data on the topic of creativity in the lives, beliefs, and practices of accomplished teachers. As recommended by Creswell (1998), the interviews were audiotaped with the expressed informed consent of each interviewee, and were transcribed prior to analysis; the recording was done via a digital audio recorder. To ensure quality and accuracy of transcripts, the audio files were professionally transcribed. Each transcript was further read and reread upon completion, not only to check for quality or minor editing/proofing issues, but to again to ensure familiarity with the text before coding the data for relevant and recurring themes.

Coding

Coding the data revealed patterns and themes that bring "meaning, structure, and order to data" (Anfara, Brown, & Mangione, 2002). Approaching the process of coding through several iterations provided a constructive way to categorize it in meaningful ways (Moustakas, 1994).

HyperResearch© (Lewins and Silver, 2010), a qualitative data coding software, was used to facilitate the process and management of textual data, and coding schemas. Using this software, three separate iterations of coding were conducted, with increasingly narrowed code lists, scaling down to a final set of codes, or themes, with the most significant themes discussed in the following findings and conclusions.

A first iteration of data brought the set of data into manageable chunks, gathered around over 40 codes, or ideas. This first set of codes was a mixture of pre-determined codes (which

were driven by the research questions of this study – e.g. how successful teachers define creativity, what kinds of avocations they pursue, impact on teaching practice, etc.), and emergent themes that appeared interesting at the outset. The second iteration of coding reduced the code list by eliminating superfluous codes and condensing others into ideas (Anfara, et al., 2002) that unify some key themes of creativity in life and teaching. In the third iteration, the code list was further tightened to the most prevalent ideas, which reflected the critical themes of the study.

Reliability and Validity

Creswell (1998) describes eight different verification techniques for qualitative research and suggests that any researcher should engage at least two of these techniques: 1) prolonged engagement or persistent observation, 2) triangulation, 3) peer-review or debriefing, 4) negative case analysis, 5) clarification of researcher bias, 6) member checks, 7) rich thick description, 8) external audits. Three of these techniques were utilized: *peer-review or debriefing, member checks, and rich thick description (through use of descriptive detail and direct quoting)*.

As an additional measure to the techniques noted, inter-coder reliability was also determined to provide more verification for these methods. Inter-coder reliability refers to the extent of agreement between two or more independent coders in the content of interest with an application of the same coding scheme (Cho, 2008). Reliability above 70% is considered acceptable reliability for qualitative coding.

Cho (2008) notes that although there are more than 30 different statistical measures or indices of inter-coder reliability, only a handful of measures are widely used and there is no consensus on the single best measure. Among all, "for its simplicity and ease of use, *percent agreement* is the single most widely used index. It is measured by the proportion of coding decisions that reached agreement out of all coding decisions made by a pair of coders" (Cho,

2008, p. 345). In the case of this research, the standard practice of simple percent agreement was used, given the open-endedness and complexity of the text being coded, and the fact that standard qualitative research methods do not stress the necessity of such statistical methods for reliability/validity (Armstrong, Gosling, Weinman, & Marteau, 1997).

A trained secondary coder did a coding of two of the eight total transcripts, so that approximately 25% of the data would have an inter-coder reliability measure, as Hruschka, et al. (2004) point out that a sampling of approximately 20% of the content is sufficient for this measure. A side-by-side comparison of the passages coded by the two different researchers was done in the HyperResearch software, with basic calculations for percent agreement. Our approximate agreement in matching coded sections (allowing for a sentence or two of variation in how we chose and selected text and passages to code) was 76% (coming in above the 70% acceptability norm).

Limitations

It should be noted that there are several limitations in this work. Speaking with each participant for 90 minutes to 2 hours opens up the conversation to interesting and detailed discussion. But the sense of openness may have led to offering more discussion of creativity in their classrooms than what they actually experience. We attempted to employ a mixture of both open-ended teaching questions and specific questions on creativity, to allow freedom in honest discussion as well as the chance for the researchers to address the specific research questions of the study. Also we engaged extensive use of direct quoting, to provide a genuine sense of the actual data alongside our own interpretations.

In being asked about issues of creativity, the participants may have felt compelled to answer questions on creative thinking skills in more affirmative ways. We attempted to control

for this to some extent, by asking for specific examples and details as to how such skills were used in their own teaching practice.

A delimitation of this study is clearly that we confined the sample to a narrow group of specific National Teacher of the Year winners and finalists, who are not necessarily representative of an overall population of teachers. Yet while this small, specific sample inhibits generalizability, statistical generalizability was not a focus of this work. Our intent was to hone in on the creative practices, avocations and thought processes of a particular group of exceptional teachers. A small and precise sample was a function of that.

Introduction to the Participants

Eight nationally award-winning teachers were interviewed with regard to three research questions/issues on the subject of creativity. Three main research questions were investigated through process. These questions are:

1. *What do successful teachers believe about creativity, and how do they define it?*
2. *How is creativity instantiated in successful teaching? In what ways is it actualized in the classrooms and teaching practices of accomplished, successful teachers?*
3. *Does the personal creativity of successful teachers impact their professional teaching creativity, and if so how? What kinds of creative interests and avocations do they pursue, and how do these things influence and connect to their teaching practices?*

This involved investigating these teachers' beliefs about and definition of creativity; how creativity is instantiated in their teaching practices; and how they draw upon personal creativity (avocation, interests, etc.) to influence their creative teaching practices. The eight National Teacher of the Year finalists or winners interviewed for this study were: Mark, Sandra, Carrie, Jack, Julia, Adam, Mia, and Marie (all names here are pseudonyms for the purpose of

anonymity), who represent a varied range of different grade levels, school subject matter, and types of schools/settings (urban, rural, suburban, etc.). Table 2 provides some basic detail on these teachers and their context.

Table 2 (attached at the end)

Beliefs about Creativity

We begin with the broadest of the three core threads investigated, and the first research question, by considering what these successful teachers themselves think about creativity. The first research question asks: *What do successful teachers believe about creativity, and how do they define it?* To explore this further, this section discusses the findings from this study dealing with the questions of: What are some of these award-winning teachers' core beliefs about the role of creativity in the classroom and following from that, what are some ways this contributes to their effective teaching practices?

Defining Creativity

The most common and universal definition of creativity across the research and literature on the topic invariably involves some elements of: 1) novelty/originality and 2) high-quality/effectiveness. In short, things that are relatively new, and high-quality or effective, are often considered "creative". After these two elements have been included though, even most research-based definitions of the term diverge. In this study, we found that these highly accomplished teachers' defined creativity at several levels, both broadly and contextually.

The teachers all incorporated some universal definitions of creativity (newness and effectiveness). Additionally, they also defined it in context-driven ways specific to teachers and classrooms. This included things such as, a student-centered focus on creativity, and the fact that creative thinking is accessible to everyone (not just "unique", "special" or "creative" people).

For example, in discussing how he defines creativity in teaching, Adam (a middle school math teacher) noted some core components of the classic creativity definition, but also situated these in a classroom context, stating,

> Well, I think being creative has to be taken into consideration from the students' perspective. So, if it's something that the students have never seen before or if it's something they latch onto or really like, that's the first cornerstone of creativity…Then the other part of that is that it's got to be a little bit entertaining, to where it makes somebody laugh or cry or at least experience an emotion. Then, it's got to be effective for learning, otherwise its just entertainment.

The relevant factors of "novel" or "interesting" are present, but Adam further links it to teaching and learning. The notion of emotional connection in experience relates to the Dewey's (1943) idea that educative experiences have an aesthetic or emotional quality that makes them powerful (Wong & Henriksen, 2008).

Mark (a middle school science teacher) noted the importance of a willingness to deal with multiple possibilities and problem solutions. He situated his definition of creativity within a learning setting, which calls to mind Kaufman & Beghetto's (2009) idea of mini-c creativity (creativity inherent in the learning process and insights of students). Mark stated that,

> A lot of times what I really strive to do is allow my students to exercise their own personal creativity, and stress that there isn't necessarily one right answer…even in something that's considered a hard discipline, like science, where there are certain facts that need to be understood…How you interact with that information and what you do with it is really what creativity is all about.

Mia (an elementary teacher) highlighted the importance of innovation that arises from background knowledge, and the ability to alter a thing into something else that is new and useful,

> Creativity means to use your background knowledge… when you are creative you are creating something new with something that you already have. Taking something that already exists and putting your own spin on it.

Douglas Hofstadter (1985), in his book "Metamagical Themas", speaks of creativity as "variations on a theme", suggesting that creativity involves taking something that already exists and varying it to create something new – or perhaps as Mia noted, "putting your own spin" on something. This suggests that everyday, "little c", forms of creativity are accessible to teachers that vary the existing themes, in order to create or re-create a lesson or teaching practice (Csikszentmihalyi, 1996; Gardner, 1999; Kaufman & Beghetto, 2009).

Corresponding to some of the more problem-solving kinds of research definitions of creativity (Cropley, 2003), Sandra (a high school language arts teacher) considers it to be a complex cognitive skill that can be learned, as she stated,

> I don't believe that people either are, or they aren't creative. I really believe that it's something that we can learn if we want to. I think that there is this myth about creativity. What it really means to me that you know how to think…You have to be able to move from the concrete to the abstract, and back again, to synthesize.

Again, with this comment, she exemplifies the way that skillful teachers emphasize creativity and define it squarely in the context of teaching. Furthermore, she talks about creativity as a learning process, which connects to the mini-c dimension of creativity suggested by Kaufman and Beghetto (2009).

While many of these award-winning teachers did note the basic factors of novelty/originality and quality/effectiveness, most of them (like Sandra) related it directly to the specific contexts of teaching and learning. These context-driven definitions suggest that Sternberg & O'Hara's (1999) framework (which emphasizes the categories of *novelty, high-quality, and task appropriateness* in defining creativity) is a useful way to think about the construct within teaching.

Creativity as a Mindset

In terms of overall beliefs about creativity, the most pervasive idea these teachers noted (in that each of them mentioned or referred to it at least once, without prompting) involves an ongoing mindset of creative thinking. This theme emerged in the data, as it became apparent in successive coding rounds that all of the teachers' comments on how they defined creativity indicated that it was an ongoing, continuous mindset – part of how they think and function. The teachers in this study described creativity not as a process or skill that is discrete or separated from other thought processes, but as an integrated aspect of their thinking.

For instance, Julia (a middle school science teacher) described it as a habit of mind and an openness of thinking,

> It's crucial in the success of an educator to be creative… It's a mindset more than anything and it's a priority…I don't exactly do interpretive dance in my classes. But, if a kid wanted to dance in my class and they felt they were going to do the dance of the cytoplasm, I'd say "Go for it buddy!"

Julia's comment here is indicative of the way that most of the teachers' talked about creativity in their classrooms, as a habit of mind that revolved cultivating enthusiasm in their

own selves, and trying new things. In a similar way, Adam (a middle school math teacher) talked about his creative process for teaching as something that is ongoing, stating,

> I'll often be doing something else. I'll see something happen, and I'm always thinking, "Well, how can I relate that to teaching?" What I do is basically, I just go through life and always - I'm always on the lookout for, "How can I apply that to teaching?" I've trained my mind to look at something and think about how it applies.

Adam also noted how he would sometimes get ideas for teaching while reading a book on a totally different subject matter (such as finding class management ideas while reading Malcolm Gladwell's "The Tipping Point"). In this way, creative inspiration can often arise when a person is actively engaged in a different activity.

Mia (an elementary teacher) views her role as a teacher as a willingness to indulge this innate creativity for learning in her students, as she puts it:

> I think something that also helps with creativity is letting loose the reins in your classrooms and opening it up to the students. As a 32 year old, my brain has been taught to think a specific way with different things. Their eight or 10 year old brains are a lot more open…Getting the kids to take some ownership for their creativity leads to a lot more creativity on the teacher's part.

Robinson (2003) has noted how creative thinking is often proficient and profound among young people, while "drill and kill" strategies of schooling tend to crush these instincts. Mia has found a way to heighten her own creativity by being open to the creative thinking skills within her young students, and to uphold the mini-c processes (personally meaningful and student-centered creativity) in their learning (Kaufman & Beghetto, 2009).

Several of these teachers noted that they are always ready to make mental connections to teaching activities, even when they are engaged in doing something completely different or pursuing outside activities. This "ongoing mindset" was one of the most pervasive and prevalent themes these teachers described about creative thinking.

Thus, our answer to our first research question (how do these accomplished teachers define creativity?) indicates that participants have a sophisticated view consistent with the scholarly definition of creativity, involving elements of novelty, high-quality, and task appropriateness (Sternberg & O'Hara, 1999). There has been a debate in the creativity literature about this definition, because earlier definitions often highlighted only two components, novelty and high-quality (newness and effectiveness). It appears that our participants support the more contextualized three-component definition. In addition they believed that key to their creative inspiration was maintaining a maintaining a mindset that is open to new ideas.

Creativity Instantiated in Teaching Practices

Moving on from their beliefs about the construct of creativity to consider how it actually plays out in their classrooms, this next section deals with our findings from the second research question of: *How is creativity instantiated in successful teaching? In what ways is it actualized in the classrooms and teaching practices of accomplished, successful teachers?* The analysis of the interviews identified three key recurrent themes from the transcripts. These themes were: 1) Taking intellectual risks; 2) Emphasizing real world or "authentic" learning; 3) Seeking cross-disciplinary curricular connections.

Intellectual Risk Taking

The first key theme that emerged in the practices of creative teachers was the notion of intellectual "risk taking". Again, risk taking was not a theme directly mentioned in this study's

interview questions, yet most of the teachers spoke of a willingness to take risks as a key element of creativity for them. Risk taking behavior has long been considered an integral component for creativity (Clifford, 1991; Dewett, 2007; Glover, 1977; Martins & Terblanche, 2003), though it has often been looked at with regard to creativity in professions such as business. Amabile (1996b) points out that creative thinking skill, to some extent, depends upon a willingness or orientation toward risk taking. So it was interesting to see this arise as in discussion of creativity with these accomplished teachers. This is not framed in the sense of haphazard or risky teaching, but in a willingness to try out new ideas and approaches in their classrooms. This openness to trying things differently allows them to come up with new and interesting approaches to teaching.

Marie (an elementary teacher) included this notion in her definition of creativity, highlighting the fact that something good always comes out of this, in that this is how powerful teaching practices develop and teachers find approaches that work well:

> Sometimes, if it is a cool thing in the classroom or in whatever work that I am doing, if it is successful, it feels like, "Wow! That really worked." Or if it doesn't, you think, "What did I learn from this?" So it's about risk taking, but it is also forgiving yourself when things don't go as you might have hoped.

In a similar vein, Adam stressed the fact that he considered this divergent method of thinking to be integral to quality teaching, stating,

> I would be willing to bet that many of the really good teachers are not rule followers…I follow the guidelines, but I've never been stressed out or fearful of bending or breaking the rules for the sake of the bigger picture of learning.

Sandra extended this idea of risk-taking by noting how she actively tries to cultivate this factor in her classroom environment:

> I need to create the kind of environment where students feel able to make mistakes and know that making mistakes is part of our work and our process. I would call it intellectual risk taking, that willingness. It's also a willingness to think in a new way or to try out different ideas and manage ambiguity. That's important to be creative…Too often in society and the classroom we rely on dichotomy.

Mark took the idea one step further, suggesting that as a teacher his role was also to model for his students the value of making and learning from mistakes, as he put it,

> It needs to be about the ability to try new things, to make mistakes, to learn from them, to collaborate about what happened. For students to see that kind of risk taking and iterative process – I think it helps them to understand how to do things well. Ultimately what students will gain from your class is not all content knowledge…it's how you approach it, that students will pull away the bigger lessons that they'll take into the real world, which is essential in this day and age.

Mark's comment underscores the idea that creativity is inherent in the process and should be considered in the thinking and learning of students. This idea dovetails with the mini-c version of creativity from Kaufman & Beghetto (2009).

A willingness to think complexly and without fear of trying out new things or breaking from convention is a key component of creativity. Much work has been done in the field of psychology, business or other domains to connect intellectual and other risk-taking behaviors with creativity (Amabile, 1996b; Broackhaus & Horowitz, 1986; Clifford, 1991; Cropley, 2000;

Dewett, 2007; Glover, 1977), and it is useful and interesting to find that this holds true for successful and creative teachers as well.

As Sandra summed it up, “Most certainly, I think you have to be willing to make mistakes if you want to be creative. You just have to...you can't be afraid of that.”

Emphasizing Real World Learning

Another theme that emerged from the data and analysis was that of “Emphasizing Real World Learning.” All of the teachers mentioned the importance of teaching with a focus on real or authentic learning. Essentially, they all had a tendency to design or create lessons that had a focus on real world applications, examples, or scenarios for their students. In asking them about lessons or classroom examples that they felt were especially creative, all cited examples that they had taught using a real world framework or application (i.e. authentic as opposed to theoretical).

As a middle school science teacher, Mark taught the topic of alternative energy sources and utilized the real world implications of the subject, to situate it in a real context for students:

> One such lesson would be around the topic of energy sources, or alternative energies. I have students conduct a town-hall style meeting where small groups of students represent energy industries, like solar, wind and fossil fuels. “Candidates” for office that represent various political parties choose a mix of energy strategies. The students are responsible to do what really happens in the real world…and they’re understanding the material, and understanding how the real world works. That's an exciting moment.

As an elementary teacher, Marie described how she often started the school day for her kids with an approach that got them out of the classroom and thinking about science in an authentic way:

> One of the things that I've always done with my fourth graders was a sky watch… They would spread out on the school courtyard. We'd talk about the clouds and the humidity and the weather and the wind direction…and we'd collect scientific data. The kids would go online and send the data to the scientists at NASA (as part of a worldwide project to connect to scientists). So in their very first 10 minutes of every school day, they had a sense they were doing something for the greater good…and they centered themselves on a day of learning.

Like the other teachers discussed here, Marie seems to naturally draw on the notion of "authenticity" by doing learning activities with precedence in the real world. In a similar way, Sandra brought a lesson on writing and research for her high school students into a more authentic context for her students as well:

> My students do a grant project where they create nonprofit organizations that have to meet the needs of a demographic group that cannot meet their "American dream". The students do interviews with people from nonprofit organizations in the community. They compete with the other groups in the classroom to fund their grants for their nonprofit. The grant panel is comprised of actual community members… Students have to support their ideas and be persuasive.

In having them create realistic texts in realistic contexts, Sandra's students engage in much of the work that anyone writing an actual grant would do: interviews, research, outside review, and so forth.

Julia noted an example of teaching a science unit, in which she created a real world application for her students within the environment of the school building, as she described it,

> With a food safety unit that I did, I gave everybody a Petri dish…I ask them what are they interested in the building that might have germs on it. They swab it and they grow it, and then they analyze it and count the colonies. Basically they analyze the microbes in the world around them. So, they're doing the work of a real microbiologist.

The statement, "doing the work of a real microbiologist" exemplifies the philosophy of authentic, real world teaching espoused by these teachers.

Adam often designs lessons that tie in his students' own ethnicity with their lessons (he teaches middle school math in a lower income 90% Hispanic population). When his students are learning graphs he has them graph lifetime earnings of different ethnicities, and college versus non-college graduates, as well as college attendance rate and how they break down by ethnicity. He noted that this usually gets their attention because,

> Latinos have really low rates of college entrance and high rates of poverty and teenage pregnancy and high school dropouts. I'll further separate it by gender and show them why Latina females have the highest dropout rates in the country. These are the ones that tie in their ethnicity, tie in their gender, and tie in their own socioeconomics and demographics.

The "real world" component of the lessons that many of these successful teachers engage in is quite often found as an integral component of excellent or "effective" teaching practices. Purcell-Gates et al. (2007) has noted the importance of "authenticity" in teaching, suggesting it is critical for students to have opportunities to engage in reading and writing of real-life texts for real-life purposes. "Real" here means real in the lives of students, so the work they do in the classroom is relevant and connected to their own lives. Such lessons are creative not just in a "real world" sense, but are also relevant to the students as individuals. This kind of practice has critical foundations in aesthetic approaches to education laid down by Dewey (1934).

Cross-disciplinary curricular connections

The notion of subject matter connectedness has a strong association with how creativity works across disciplines, in that subject matters are not discrete or disconnected, but fluidly related to each other (Root-Bernstein, 1999). As previously noted, there is a substantial amount of research across different professions to suggest that creativity is connected to a tendency to think across domains (Caper, 1996; Feinstein, 2006; Simonton 1999; 2000; 2003). This was a significant theme here too, because each teacher spoke or gave examples of teaching subject matters with the arts or music, or of simply using one subject matter in order to teach another.

As a middle school science teacher, Mark gave numerous examples in which he used varied other subject matters, such as the arts, to teach science concepts to his students:

> We do a lot of theater and kinesthetic movement, where students might represent different creatures in an ecosystem or they might represent different elementary particles in an atom…Or, I’ve created a natural selection simulation, and we'll do that - but then they'll have a chance then to create their own simulation, their own game about natural selection, organisms, species, their own environmental changes and traits that are going to change. So they're doing the creation based on what something new they've learned. And that's ultimately my goal is…to inspire them to then get creative and demonstrate and process what they've learned.

For Mark, these cross-curricular connections are not just a part of many of his creative lessons, but are how he inspires his students to tap into their own creativity.

As a middle school science teacher, Julia is a major proponent of the connections of other subject matter to the teaching of science. She described how she created a special course at her school, to give science a more social/cultural dynamic:

> For those who want to be involved in a few more field trips or real-life connectedness things, I created a special class, called a "Future Think Class". We do science-related community service, like the Adopt-a-Beach activity, or we talk about life or conditions for people in other cultures…I try to connect kids to larger causes outside of their lives; to bring a social dimension into the sciences.

Adam gave several examples of his cross-disciplinary approach to teaching math. He often teaches his students a little about advertising and psychology in order to make a math concept more vivid, as he described it,

> One of my favorite lessons is where we talk about advertising. We talked about company slogans and advertising and how there are different types of advertising. And one type of course, is with math and with numbers, such as "save fifty percent", percentages off and things like that. So the students get really engaged in advertising and how advertisers try to target them as young adults.

Adam even has created special classroom characters that help him relate to the students some of the different ways in which math connects to other subject matters, as he noted,

> I've got a lot of special guests that visit my classroom. It's really just me, but I've got a bunch of different outfits. And one of the special guests that comes from time to time, I call him, "the Math Professor." His tagline is "there is nothing that does not have something to do with math." If you can stump the Math Professor, you can win a prize. The kids bring up language arts or science…and the Math Professor explains and relates it to math.

As a language arts teacher, Sandra described an example in which she used musical concepts to teach a complex text to her high school students. This teaching example was derived

when she recognized the connection between movements in music and movements in text, as she stated:

> One time, I was watching an interview on The Actors' Studio, with Billy Joel. He was talking the craft of making music, and these different genres that he's explored over his career. The movement he was describing, and some of the songs that he had written sounded very much like the movements that writers use when they are writing a short novella. So I was thinking about the book that I teach "The Metamorphosis" by Kafka and how there are these very definitive movements in the text and how it resembles the movements in Billy Joel's music. And then I started to consult some music teachers that I know, and I asked them to tell me more about these movements. The next time I talked about the book, we had a day where I had my students who were musical speak about movements in music before we discussed Kafka. This helped everyone to see this connection between music and text and to understand both.

Sandra's example above is particularly interesting because it takes the notion of cross-curricular teaching to the next level of creativity. Her example actually uses the content from one subject, music, to examine and illuminate a totally different topic in another genre of literature. This not only crosses the lines between diverse curricula, but also manages to uphold the content of both subjects, using one to enlighten the other.

The crisscrossing of topics and subject matters is not necessarily something that is easy, as several teachers noted, given the rigid schedules and standardized curriculums of current educational policy. In fact, as Adam had noted during our discussion of cross-disciplinary teaching, that this was not something that national standards/curriculum was always amenable to, stating,

> I actually think that's one of the weaknesses of American education, is our inability to make connections across subject matters. We've moved so far away from projects to covering the standards as quickly as possible that we've lost a lot of those connections. I'd like to see American education move towards more of a truly inter-disciplinary curriculum.

Despite these systemic roadblocks to cross-curricular thinking and teaching, these exceptional teachers find ways to manage and work this into their practice. It would seem that creative teachers have a more fluid approach to subject matter boundaries, and demonstrate how ideas and learning crisscross subject matters and domains. This is also consistent with other research, which shows that creative practitioners in many different disciplines (science, art, engineering, etc.) think and work in similar ways (Caper, 1996; Root-Bernstein, 1996; 1999).

Integrating These Three Themes of Creative Teaching

In considering our second research question (as to how creativity is instantiated in successful teaching and it what ways is it actualized in the classroom) our analysis of the interview transcripts led us to three emergent themes, that of intellectual risk-taking, connecting learning to the real world, and the value of making cross-curricular connections. Two of these themes (of intellectual risk-taking and making cross-curricular connections) already resonate with existing theories of creativity (Root-Bernstein, 1999).

Research on creative individuals has often highlighted the value of risk-taking for creativity (Amabile, 1996a; Clifford, 1991; Dewett, 2007; Glover, 1977; Martins & Terblanche, 2003). Since it has been associated with creativity in disciplines like science or business, it was interesting to see this also come up among successful teachers. The importance of cross-disciplinary thinking also has connections to other areas of creativity research. Root Bernstein

(1999) has done extensive work showing how creativity involves making connections and thinking across domains. Steve Jobs once famously said in an interview (Wolf, 1995), "Creativity is just connecting things." As he went on to explain,

> "When you ask creative people how they did something, they feel a little guilty because they didn't really do it, they just saw something. It seemed obvious to them after a while. That's because they were able to connect experiences they've had and synthesize new things."

So there is certainly existing thinking and research on creativity that speaks to the value of cross-disciplinary thinking (Feinstein, 2006; Gruber, 1974; 1988; Harrington, 1990; Mishra, Koehler, & Henriksen, 2011; Root-Bernstein, 1996, 1999; Simonton, 2000; 2003).

But the third theme (making real world connections to learning) is somewhat different. For instance, it is unclear whether such "real world" learning/teaching is necessarily a function of creative teachers. For that matter, many teachers assign students "real world" activities or "authentic" tasks, and relate lessons to the real world. In fact, real world activities have often been described as a facet of good teaching practice across the board (Purcell-Gates, 2007). The connection to creativity however is not immediately apparent. Since these were themes that emerged organically and qualitatively (albeit strongly), it is difficult to make conjectures about correlations between themes.

One possibility is that teaching, in and of itself, is inherently about preparing students for the real world (which is often not as bounded or defined as school subjects); so creative teachers have that mission very deeply in their heart, and it may arise quite frequently in varied attempts to have students engage in learning that reflects the real world.

It seems possible that "real world" may connect logically to both risk-taking and cross-disciplinary thinking. For instance, within the highly structured, high stakes, and standards-based environment that many teachers today work in, deviations from such standards or textbook approaches, toward real world methods might be more prevalent among intellectual risk takers. This includes teachers that are willing or able to try something unscripted, and centered in a local context their students can relate to.

Furthermore, because learning and knowledge in the real world is not tightly bounded by discipline (for example, a scientist working on alternative energy issues will invariably brush up against politics, engineering, design, etc.) it may be that real world learning naturally comes in to play with teachers who think and work in inter/cross-disciplinary ways.

That said, we are careful not to suggest that "real world" teaching in and of itself equates with "creative" teaching, but it seems to be one facet of such practice that helps these teachers connect with students in powerful ways. We do suggest that these themes may hang together in an inter-related or coherent manner. For example, a teacher who is an intellectual risk taker may be more willing to take learning out into real world settings. In these real world settings disciplines are not tightly bounded and cross-disciplinary approaches are necessary. Thus, the relationship between the three themes is not simple or one-directional, but is complex and variable. In some cases, a creative teacher's practice may begin from a tendency for cross-disciplinary thinking, which pushes them in more "real world" directions for teaching, which requires intellectual risk taking. However, multi-dimensional and complex the inter-relationship between these constructs may be, we can only say that they were recurrent and important for these successful creative teachers, and we suggest that they hang together as a coherent structure or framework for a rich, integrated and creative approach to teaching.

Personal Life Creativity Contributes to Professional Creativity

Moving on from the issue of what creative teachers do, we consider where their ideas come from in taking on the third and final research question of: *Does the personal creativity of successful teachers impact their professional teaching creativity, and if so how? What kinds of creative interests and avocations do they pursue, and how do these things influence and connect to their teaching practices?* This study provides evidence that people who are accomplished as successful classroom teachers also have a variety of avocations and pursuits in different creative, kinesthetic, and subject matter realms. More importantly, they note the direct influence that these activities had in impacting their creativity overall and as a teacher.

The majority of the teachers had avocations which tended to fall into categories of 1) music or the arts, and/or 2) physical or kinesthetic realms. They noted that their avocations and interests impact their professional work because creative teachers "teach who they are". Creative hobbies in music or art worked their way into the teaching of subject matter or classroom activities. And physical or kinesthetic hobbies were noted as significant for clearing the mind and stimulating mental processes among creative people.

All eight accomplished teachers in this study described the importance of multiple creative interests or varied avocations in their lives, which they explicitly credited with improving and informing their practices inside the classroom.

Interest in the arts and music were among the most popular, with six of the eight teachers noting that they personally engaged in musical or artistic hobbies, which they actively integrate into their teaching practice in a variety of different subject matters. In addition to music or art, physical/athletic pursuits were equally popular, with six of the eight teachers also engaging in these types of kinesthetic avocations. These teachers noted having multiple avocations, which

featured prominently in their lives, ranging widely from interests in cooking, photography, writing/poetry, gardening, travel, and particular subject matter interests, among others. Each of the teachers' personal interests and avocations are briefly mentioned in the section on participant descriptions, and Table 3 summarizes some activities and creative avocations they each discussed during our interviews:

Table 3 (attached on separate page)

Most importantly, not only did all of these highly accomplished teachers engage in several diverse interests/avocations, but these teachers connected their personal creative endeavors to their teaching work.

Music and the Arts: Translating Avocations into Teaching Practice

The majority of the accomplished teachers, six of the eight interviewed in this study, described having an interest in either musical or visual artistic avocations. More significantly, for most of the teachers having an interest or inclination toward music or art has become a teaching tool that has carried over from their lives into the classroom. This is significant, in that this is not a focus that has been explored much among teachers, yet it is consistent with findings on creativity in other disciplines such as science or business (Feinstein, 2006; Root-Bernstein, 1999).

For example, Adam (a middle school math teacher) has had enormous success in teaching math concepts using rap music. His success with this practice started in his own classroom, but has spread with the success of his nationally recognized "Rappin' Mathematician" CD. It actual inception however, began with his own personal interest in rap music,

> I've always been a fan of rap music, and was always good at it. I listen to a song a few times and I sing it back, and I can think in rhythms fairly quickly, so I could make them

> up. I don't have any formal music background, so it's very important for me to make a distinction that I'm a teacher who raps. I'm not a rapper who teaches.

Coming up with original rap songs about school subject matter might be daunting to anyone unfamiliar with the rap genre. But as Adam states here the critical point is not really the use of rap, but the fact that he co-opts his personal creativity/interests as a valuable teaching technique. The use of rap is incidental to the broader notion of personal creativity, as he said,

> Other teachers come up to me and say, "Wow! My students want to know why I don't rap like you." And I tell them it's not about rapping, it's just about connecting in their language, on a level that's both fun and focused on the academics.

Connecting with students in a creative or artful way that is relevant to their own lives is really the key issue here. Jack (an elementary teacher) similarly noted that the arts were an important part of his life and his teaching, and that every teacher could find ways to draw their own creative passions into the classroom.

> The arts are a part of my life…Working with new teachers is a way to open up people's eyes to see that your particular talent may not be singing, but you can use these concepts of creative teaching. You can take whatever gifts or interests or expertise that you bring to the class…your chance is to hone in on that creativity and see ways that you can make connections for your kids.

The notion that having an interest in music or the arts would bleed over into the classroom practices of a creative teacher was also described by Mia, a highly creative third grade teacher. She is also an amateur musician herself, playing both the piano and the violin, and she described her musical approach to other subject matters, for example having her students come up with songs about a math topic, as she described it,

> When we were learning right, and obtuse and acute angels, my class and I came up with a song and a dance to Beyonce's “I'm a diva” but instead of “I'm a diva” we created a whole dance to "I'm an angle". Using all different learning styles, audio, auditory, visual, kinesthetic, tactile, the kids were creating a song of their own… at test time you see them at their desk, they are bopping out the song - they *own* it.

Interestingly enough such creativity manifests not just in the teaching of traditionally “creative” subjects and topics, but it reveals itself across a wide range of different subjects.

Mark (a middle school science teacher) is also interested in the visual arts and (having dabbled in graphic design and photography, as well as playing guitar and piano). He discussed using his own artistic interests to teach science in a way that is more authentic and exciting for his students, but also crosses the curriculum. As he describes it,

> The activity is pretty simple. I have students create an advertisement, trying to sell a science concept (like chloroplasts for photosynthesis)…They create a graphic image and some text and design elements. It gets the idea across effectively and teaches them another discipline too…and we don't have an art program anymore. So we've got to do that in our core classes or it doesn't happen.

Mark’s description shows how creative thinking across the disciplines can translate into a more cross-curricular and impactful learning experience. As he describes the impact,

> Our science scores have been steadily going up over the last several years, but what I'm more excited about is the fact that kids are actually coming out of our middle school excited about science and enjoying it…We met with our high school teachers last spring and they said it's a huge difference, that eight or 10 years ago kids would come to the high school and walk into their science class and look at that science teacher and say, “I

> hate you. I hate science." But now they come in and not only do they have some skills and knowledge to go with it, but they're excited about learning stuff because it's cool.

It seems abundantly clear in these described experiences, that interests and avocations do influence creative teaching practice, and one significant way this occurs is through involvement in some creative pursuit (the arts or music), which comes through in the course of teaching activity. Whether it is in the way that Mark uses art and design to teach science or Adam uses music to teach math, the blending of different disciplines into teaching and learning activities, for these particular teachers, is facilitated by their creative passions. This is a significant addition to our understanding of creativity in teaching, and is also connected to creativity work on personal and professional creativity in other fields (Feinstein, 2006; Root-Bernstein, 1999; Simonton, 1999; 2000; 2003)

Athletics/Kinesthetic Pursuits: Mind/Body Connections

While the varied artistic, musical or other creative pursuits of these accomplished teachers were powerfully evident in their teaching practices, it is also important to recognize that physical or athletic pursuits were also significant and influential avocations for many of these creative teachers. Six of the eight teachers talked about having physical/athletic hobbies, which they again often credited with improving their teaching and overall thinking in life.

Mia discussed the impact of athletics and movement on her thought processes, and noted that this was a key way of formulating ideas for her,

> Running truly spurs my thinking most of the time. It gets my thought processes going if I can move in some way. Exercise is the best little motivator for your brain to come up with great ideas. After you go out on a run you come up with 1000 good ideas, or even during a shower after I keep a little jot pad nearby where I can jot things down.

Adam noted that he had been a competitive swimmer the age of five and continues to swim a lot. He's also been a surfer his whole life and described the ways in which he's developed a lot of "good ideas while sitting on my surfboard", as he put it,

> Surfing sometimes, when the waves are really good, it can be so intense that you absolutely cannot think about anything…you have to just stay and focus. While I'm actually in the physical act of surfing, I focus intently on just that, which I know is building a different part of my brain. Other times the waves are really small and I'm going out there to relax and have fun. I might chew over an idea for work in my head. I'll always come in from that refreshed and willing to try something another way or just drop something that's not working.

The notion that physical movement and bodily sensations have an innate relation to creative thought processes was also discussed by Sandra who felt, like the other teachers, that athletic pursuits provided clarity of mind that helped improve her thinking in general, or as she stated it,

> I always have some outside pursuits related to athletics since I was very young. I've kick-boxed for about three years really intensely, and I run quite a bit…I think it offers clarity. I can only speak personally to that one, but I think it does offer clarity of mind. A lot of times, I use those athletic endeavors to give me that focus. To wipe everything clean, so I can concentrate on what's most important at that time.

Marie also connected to the notion that physical or kinesthetic pursuits were useful for improving her thought processes in the sense that for her, yoga provides not just an avocation, but also a means of reflective thinking and idea generation,

> Yoga is a really awesome thing because it helps me…to be more introspective. To slow down my brain enough to really be a whole lot more reflective. It's an organized way of allowing my mind to really focus in on just these particular body movements, which actually opens things up to some of the other big complex ideas.

The teachers in this study clearly connected with the notion that physical movement and mental activity have an important link, and this can be noted in their propensity for physical avocations, among their other interests.

We Teach Who We Are

Avocation is a word that defines itself, as something *other than* a *vocation*, or activities that we do separate from work life, for the enjoyment or interest of them. Human interests in creative pursuits or extracurricular activities are nothing new or unusual, and in some sense is part of who we are and part of a balanced psychology (Miller, 1999).

All of the teachers involved in this study described having multiple avocations (as described in the above section) outside of teaching, and that these influenced their thinking within the profession and their teaching practice itself. One of the teachers, Sandra (a high school English teacher), reflected on the importance of meaningful or creative avocations in life, because in profession of teaching, "we teach who we are". This was an emergent theme during the reading of the text data and process of coding, because many of the teachers comments seemed to echo this sentiment. As Sandra stated,

> Outside pursuits always factor into your thinking about your classroom or your students - all the time…I think that *we teach who we are*, and I know that I teach who I am. So, if I am really into kickboxing, I see how facets of that experience connect to things that we're learning in class. If I am reading about Frank Lloyd Wright, which is what I'm doing

> right now, then I see how something about Frank Lloyd Wright applies to something that we're studying. I think that's true all of the time, that whatever it is that interests you…how that energy manifests itself in the fabric of the classroom.

As Sandra notes here, an inclination toward creative or varied interests naturally reveals itself in the work of a teacher, and adds dynamism and variety to their teaching practice. This kind of idea was also expressed by Julia, a middle school science teacher who engages in a wide variety of interests and avocations herself. She noted how she considers these outlets to be integral in her approach to teaching, commenting,

> I have to be in a job where I can exercise some creativity… I have to have the ability to grab multiple colors and multiple palettes and multiple media and weave together what I see as a vital, vibrant day for my students, and for myself.

Carrie (a middle and high school English teacher), is extremely creative in verbal genres, and does a great deal of creative writing and poetry in her spare time. She sees this creativity as part of who she is as an individual and a teacher, and her avocations play directly into her teaching practice, or in her own words,

> What I think is a little different from other people, is my enjoyment in my spare time of reading, creative writing, and writing poetry. Robert Frost said that writing poetry - he called it a homesickness. It's like a homesickness and a lovesickness, when you get this lump in your throat. There is something that if you don't get it out of you and put it on a piece of paper, it's just going to eat you up. And that is how I feel and I feel that way about words, too. That's the way that I'm creative, and it comes out in my teaching.

In this way, Carrie's experience of personal creativity in her avocation is highly valuable to her work as a teacher. It is less cross-curricular than some of the examples that other teachers

noted in this study, but is deeply connected to the notion of creativity as a critical aspect of the lives and teaching practices of accomplished teachers.

Another teacher, Jack, noted that using personal creative approaches in his teaching practice has helped all of his young elementary students to either meet or exceed state standards for the first time, in their math proficiency. In describing the impact of his own avocations and pursuits on teaching, he summarized it as such, "I guess it's hard to separate the life of a teacher into compartments. There's so much that goes on that finds its way into the classroom."

Conclusions

Summary of Findings

In line with the Sternberg & O'Hara (1999) view of creativity as being novel, high-quality, and task appropriate, the teachers in this study defined creativity in ways that align with traditional definitions of creativity, but that also include more subjective and contextual considerations, specific to teaching (the "task appropriate" component). A "creative mindset" was described as important for promoting creative thinking; and in this way, a certain amount of "cross-pollinating" of knowledge occurs, as the teachers are open to new ideas from other disciplines or experiences.

These teachers described how they implement creative approaches in their classrooms that utilize *real world learning*, *cross-curricular connections*, and a *willing to take intellectual risks*. As we have noted, these were themes that emerged organically in the course of interview discussions.

Risk-taking has frequently been shown as a vital component for creativity (Amabile, 1996a; Clifford, 1991; Dewett, 2007; Glover, 1977; Martins & Terblanche, 2003). And existing thinking and research on creativity has frequently noted the importance of cross-disciplinary

thinking (Feinstein, 2006; Gruber, 1974; 1988; Harrington, 1990; Mishra, et al., 2011; Root-Bernstein, 1996, 1999; Simonton, 2000; 2003). We suggest that the other component of real world learning/teaching, which has generally been noted as a quality of good teaching in general (Purcell-Gates, 2007), is one part of this structure of creative teaching tendencies. We do not imply that real world learning by itself makes someone a "creative teacher", but rather that the themes seem to hang together in an inter-related way, as discussed in the previous section on integrating the approaches.

Our discussion of *real world learning*, *cross-curricular connections*, and *willing to take intellectual risks* as individual themes, is done to tease them apart as core concepts relating to how these creative teachers work. Slicing the world this way is an analytic move, useful to separate themes and parse them for understanding, discussion, and examples. But the actual relationship between the themes may be more variable and web-like in practice. Thus, these three themes support each other within a rich, integrated and creative approach to teaching.

Another core finding of this study suggested that outside pursuits always factor into how creative teachers think about their classrooms, because teachers tend to "teach who they are". They begin to see connections between their own interests in anything from rap music to cooking or travel, to school subject matters like math or language arts, and thereby find interesting ways to teach and develop creative lessons. This factor of integrating outside interests and personal life creativity into professional disciplines is consistent with findings from other creativity scholarship in other disciplines (Feinstein, 2006; Gruber 1974; Harrington, 1990; Root-Bernstein, 1999; Simonton, 1991; 1999; 2000; 2003).

This also connects deeply to the Deweyan ideas of "Art as Experience", in which there is an inextricable link between the classical aesthetic experience of art and everyday activities and experiences (Dewey, 1934). As Dewey frames it,

> So extensive and subtly pervasive are the ideas that set art on upon a remote pedestal, that many a person would be repelled rather than pleased if told that he enjoyed his casual recreations, at least in part, because of their aesthetic quality. The arts which today have most vitality for the average person are the things he does not take to be arts; for instance, the movie, jazzed music, the comic strip…The task is to restore confidence between the refined and intensified forms of experience that are works of art and the everyday events, doings, and sufferings that are universally recognized to constitute experience (Dewey, pp. 5, 1934).

While something like the notion of using music or art in teaching activities might seem daunting to anyone unfamiliar with the disciplines, we stress that it is not the medium itself that is important, but the fact that these teachers co-opted their personal interests and creativity, and use them in effective teaching techniques.

It has been suggested that all creativity builds upon things and ideas that already exist, or arises from combinations of experiences and inspirations encountered in our lives (Ferguson, 2011; Henriksen, Mishra, & the Deep-Play Research Group, 2014). Popova (2012) notes how creative thinkers have often asserted the importance of a "rich personal micro-culture" (a mindset, interest, avocations and ways of being in the world) that encourage new combinations of ideas toward their creative ends. Thus, creative thought is not a talent that is unique to certain individuals, but a matrix of knowledge and inspirations from our life experiences, which can be

strengthened when we expand on and are free to draw from such varied personal knowledge/experience (Mishra, Henriksen, & the Deep-Play Research Group, 2014).

The notion of creativity in avocations or outside life vs. creativity in professional accomplishment is analogous to the, "little c" (or "everyday" creativity) vs. "Big C" (or "sublime" creativity) paradigm discussed by such researchers as Gardner (1999), Csikszentmihalyi (1996).

The lived experiences of these teachers in this study shows that "little c", or everyday creativity, expressed in avocations or creative interests has a profound impact on the way talented educators utilize sublime teaching creativity. The personal meaning that they placed on creativity in the learning experiences of students is reflective of Kaufman & Beghetto's (2009) mini-c construct of creativity.

The Challenge of Creative Teaching Today

Many teachers today struggle to balance high stakes testing and accountability, with the ability to act flexibly, independently and creatively in their classrooms. Despite being some of the most recognized and lauded teachers in the country, many of the teachers in this study commented on how they were acutely aware of the systemic challenges to creativity.

At the national level, educational policy can be restrictive to innovation in teaching. Yet a supportive administrator at the local level can make all the difference. Mark commented that he felt fortunate (and acknowledged that his situation was rare) to have a school setting that was conducive to taking teaching risks by trying new approaches. He noted:

> My principal over the years has been very supportive in the fact that he's OK with me trying new things… He also sees the fire in the students' eyes, the passion for learning, and the excitement about science. When administration sees that, wow, it's not just our

> achievement scores that are going up, but also a lot of other things that we are not necessarily measuring.

Mark's students have increasingly met and exceeded their standards (even in a low-income and struggling rural district), due to his willingness to focus on creative and varied approaches to teaching, and supportive administration that allows him to do so. But he recognizes that many teachers are not as fortunate, and he summed up the current systemic challenges as such,

> I think that there's a lot of fear. And when teachers are teaching in fear, they take few risks. And ultimately I think that's going to sink our educational system, this sort of fear-based climate that everything's all about achievement, achievement, achievement.

Implications for Teacher Education Programs

The role of creativity in teacher education is not always clear, and varies depending on schools and programs (Craft, 2000). Teaching behavior and values are often constructed or foundationally taught in pre-service. Accordingly, we emphasize the importance of infusing creativity into teaching and teaching practices at this stage of teacher learning.

Helping pre-service teachers tap into their own personal creativity is one important way that teaching programs could prepare new teachers to think of themselves as creative individuals. Teacher education courses that encourage a bridge between creative hobbies and interests and teaching practices, lessons and activities may be important to consider. Pre-service teachers might be well served by a requirement of taking courses in the arts or music (or anything of interest outside of their major specialization in teaching), and then integrating this cross-disciplinary knowledge into their teaching coursework. Giving pre-service teachers more

opportunities to engage in art/design-based or music-based lesson planning is also a step on a path toward more creative teaching practices.

Furthermore, it may be important and beneficial for teacher education programs to employ more resources into interdisciplinary thinking and training. This could be done through infusing the importance of thinking across disciplines into existing coursework, and also through offering courses with a special focus on integrating the disciplines. It may be particularly important to employ this strategy for secondary teachers. Such integrated approaches are sometimes offered for elementary pre-service teachers, but given the nature and structure of our educational system, secondary teachers are often in their own "silos", and such courses are rarely offered to those who might benefit most.

Implications for Educational Policy

In recent decades, educational policy in the United States has seen a definitive focus on standardization and accountability, as quantifiably measured through basic standardized tests. The problems with some of the standardized teaching approaches and rigorously paced content is that they often have the adverse effect of killing curiosity, creativity and enjoyment in learning; in short, all of the things that stimulate a desire to learn in school and throughout life (Fusarelli, 2004; Jones, Jones, & Hargrove, 2003; Robinson, 2003). When teachers are deprived of the opportunity to foster creativity in their classrooms, students cannot begin to develop a mastery of critical or creative thinking abilities (Broadfoot, 1996; Giroux & Schmidt, 2004; Mock, Moorman, & Lewis, 2006). That is not to say that there is no place for standards, or for having measures of accountability, but rather that the current high-stakes testing model or "teacher-proof" curriculums have impeded fostering of creativity in classrooms and students.

This is problematic because at a global level, creative thinkers are needed to solve problems and develop solutions in modern society. In business and technology, companies like Apple or Microsoft seek innovative hires. In mathematics or the sciences, creativity is strongly correlated to professional accomplishment (Root-Bernstein, 1996). In subject matters from writing, to design, to art or music, creativity has always been and will continue to be a driving force in moving society forward.

The kinds of effective creative lessons that these highly recognized teachers mentioned frequently used artistic, design-based, or musical approaches to teaching school subject matter; and they also implemented a variety of cross-curricular approaches, or real world learning, in their classrooms. Incorporating more of these of approaches into national curriculum (as opposed to test-driven or drill-oriented approaches) would be a way to broadly instantiate the excellence that we recognize in individual educators, and infuse it into the system. Furthermore, offering professional development opportunities at a broader level, based around some of these themes of creative teaching, (such as real world learning opportunities, interdisciplinary approaches, and infusion of personal creativity into classroom approaches) could be beneficial.

Creativity has become a subject of intense interest in education, yet the current state of educational policy, with its rigid policy and curriculum, high stakes testing, and standardized "teaching to the test" approaches, does not necessarily uphold its importance or give it appropriate attention in curriculum initiatives.

This qualitative study sought to better understand some of the elements of the personal and teaching creativity of excellent teachers – with an eye toward the ways that these authentic, artistic, aesthetic, cross-curricular, open-minded, and risk-taking approaches can serve the field of teaching and research into the educational needs of the future.

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Table 1
Research Questions & Instrumentation Cross-Reference

Research Questions		**Interview Protocol Items**
Question 1	Does creativity play a significant role in the teaching practices of accomplished teachers, and if so in what ways?	Questions 5-8
Question 1a	What does "creativity" mean to these accomplished teachers? How do they define creativity? Is it an important part of effective teaching practice.	Question 4
Question 2	How is creativity instantiated in creative teachers' teaching practices? What are some examples or elements of "creative" teaching in their classrooms?	Question 8
Question 3	Do successful, accomplished teachers engage in creative practices and avocations, and do these avocations impact their thinking and teaching?	Questions 10-12
Question 3a	What kinds of interests and/or creative pursuits do these accomplished teachers engage in?	Question 10
Question 3b	Do these successful teachers feel that their avocations and interests influence their teaching practice, and in what ways?	Questions 11, 12
Note: Questions 1-3 on the interview protocol were "warm-up" questions, designed to start the conversation on teaching and build discussion rapport. They do not necessarily correspond to research questions noted above.		

Table 2
Teacher Backgrounds

Teacher	Grade Level and Subject Matter	School Setting
Mark	Middle School - Sciences	Rural (many students at or below poverty level)
Sandra	High School – English/Language Arts	Suburban
Carrie	Middle/High School – English/Language Arts	Rural/suburban (many "at risk" students)
Jack	Elementary – 3rd grade	Rural (Title 1 school with disadvantaged students)
Julia	Middle School	Urban (many students at or below poverty level)
Adam	Middle School – Mathematics	Urban (many students at or below poverty level, high drop-out rates)
Mia	Elementary – 2nd grade	Urban (many students at or below poverty level)
Marie	Elementary – 4th grade	Suburban

Table 3
Participant Teacher Avocations

Mark	Music (guitar, piano, composing); Visual Arts (drawing, sketch, graphic arts); Photography (digital and darkroom); Physical/Athletic (rock climbing)
Sandra	Reading (varied subjects); Games, Film, Writing, Technology; Physical/Athletic (running, kickboxing)
Carrie	Writing (creative writing, non-fiction, poetry); Reading; Word Games/Puzzles
Jack	Music (singing, composing); Travel; Community Service/Volunteer work
Julia	Visual Arts (drawing and sketching); Sewing; Reading (varied subjects); Physical/Athletic (nature walks and hiking)
Adam	Music (composing rhymes, raps); Reading; Physical/Athletic (competitive surfing, swimming); Travel
Mia	Music (piano and the violin); Cooking; Gardening (all aspects including landscape architecture); Running (long distance, competitive)
Marie	Music; Reading; Cooking; Physical/Athletic (yoga, walking)

Appendix A

Semi-structured Interview Protocol

Open-ended Warm-up Questions

1. Tell me a little about where you teach. *(Possible probe: Tell me about your classroom, setting, students)*

2. What inspired your motivation to teach? *(Possible probe: Did you start out in teaching or a different field?)*

3. Tell me what it's like to be a teacher today. *(Possible probe: What are some of the challenges and rewards of this profession today)*

Creativity and Teaching in General

4. How do you define "creativity"? Or what does it mean to be creative? *(Possible probes: What does creativity mean in the general sense of the word? How do you define or judge creativity in teaching practice?)*

5. How do you come up with a creative idea for a lesson or a teaching practice?

6. As someone who has been noted as an accomplished teacher, what do you think makes a teacher effective or successful in the classroom?

7. What do you think makes a lesson or a teaching practice successful for you?

8. What are some of your favorite examples of the creative lessons that you have done with your students? *(Possible probe: What kinds of lessons or teaching practices do you find that your students have responded to very well?*)

9. Are there sometimes connections between different subjects or areas of interest? Can you talk a bit about this?

10. Do you have any outside interests or creative pursuits that you spend time on outside of your professional life? *(Possible probes: Tell me a little more about these hobbies/avocations. What do they mean to you, or how have they enriched your life?)*

11. Do your activities or creative work outside of teaching ever factor into your thinking about your classroom or students? *(Possible probes: In what ways does this tend to happen? Are there inspirations in avocations that inspire your teaching?)*

12. In what ways do creative ideas come to you? *(Possible probes: Could you tell me a little bit about a specific creative project or activity outside of teaching? How did the idea or inspiration come to you? Have you noticed a particular place or activity that seems to bring about creative ideas?)*

13. Final question – what do you think are the key skills, attributes and/or characteristics of an exceptional teacher?