

# Rethinking Technology & Creativity in the 21st Century

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**Note: The published article, mistakenly placed a wrong title on the at the top of the page. The actual title of the article is "Play as a Foundational Thinking Skill & Trans-disciplinary Habit of Mind."**

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“A master in the art of living draws no sharp distinction between his work and his play...”  
– François-René de Chateaubriand

“The one thing that you have that nobody else has is you. Your voice, your mind, your story, your vision. So write and draw and build and play and dance and live as only you can.”  
– Neil Gaiman

“Play is the child’s work.”  
– Jean Piaget

*We have argued previously for seven “tools for thinking” that underlie trans-disciplinary thinking and creativity (Mishra, Koehler, & Henriksen, 2011). Inspired in part by Root-Bernstein & Root-Bernstein’s (1999) work in this area, we argue that these skills encapsulate the ways in which creative people think. These seven skills are: Perceiving, Patterning, Abstracting, Embodied Thinking, Modeling, Play, and Synthesizing. Our last article (Henriksen, Terry, & Mishra, in press) was on the skill of Modeling, while this article focuses on Play.*

## Introduction

“Playing” is most often considered a pastime of those who have yet to reach an age that requires two digits, or perhaps the lucky few who have found themselves athletically inclined enough to make a career in sport. The “just for fun” view of play

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often precludes it from immediate association with schools (with the exception of recess), learning, or as a particularly productive habit of mind. Rather than isolating it from these kinds of endeavors, however, play can offer a critical service in the creative process for both old and young alike (Conklin, 2014; Mishra, Koehler & Henriksen, 2011; Root-Bernstein & Root-Bernstein, 1999). In fact, we suggest that play is not only an aspect of life that brings joy, fun and meaning – core elements unto themselves, but is foundational to the way that we learn and develop throughout life.

In their book, *Sparks of Genius*, Robert and Michele Root-Bernstein (1999) identify play as “...a childlike joy in the endeavor at hand, an irreverence for conventional procedure, purpose or the ‘rules of the game’” (Root-Bernstein & Root-Bernstein, 1999, p. 26). Building on this understanding of play, Mishra, Koehler & Henriksen (2011) add that “deep” or “transformational” play is characterized by its open-endedness, a feature that contributes to its potential to inspire creative, boundary-extending ideas. This type of play is character-

ized not just by aimless games or playground antics (though all play has its value in turn) but as a cognitive skill that occurs whenever people “play” with ideas, signs, symbols, or artifacts in a somewhat open-ended way, just to see what comes of it. When defined this way play becomes an essential component of thinking and learning.

As a key creative thinking skill, successful thinkers and practitioners use play across varied disciplines. It is a way to explore distinctions and unassailable boundaries or truths, a way to discover new things and inspire creative break-throughs. This column will look more deeply at the genesis of play as a meaning-making tool (Almon, 2003), the integration of play and work, and the importance of play in education.

## Developing through Play: Evolution’s Motivating Force for Learning

The idea of play has had much attention from scholars in recent years (Huizinga, 1950). While there are many ways of thinking about the concept, Koehler et al. (2011) note that

there seem to be four commonalities to play. One key attribute is that play is *voluntary* – people choose to do it rather than having it imposed. Another related attribute is that play is *intrinsically motivating*. The “just for fun” aspect that we mentioned separates play from external rewards or incentives. A third attribute is that play can engage both mind and body, tapping physical and cognitive ability. Lastly, it must be noted that play differs from other behaviors because of its imaginative quality (Blanchard and Cheska, 1985; Csikszentmihalyi, 1990; Pellegrini, 1995; Pellegrini and Smith, 1993; Yawkey and Pellegrini, 1984).

Play is often linked to enriched thinking, more flexible brains, and the ability to improvise – which leads to a “mental suppleness” and a broader vocabulary of behaviors across the span of development (Koehler et al., 2011). Play has strong evolutionary roots among many species (humans, as well as many mammals) as motivation for learning. In *The Evolution of Childhood*, Konner (2010) emphasizes not only the value, but also the necessity of play for learning. He reflects on the fact that among juveniles of any age group, play is a core activity. Yet there is also a great energy expenditure that comes from play and with it increased food requirements and risk. The skill would not have evolved without a significant adaptive value. In watching young cats of any type at play, it is clear that this is where they learn hunting skills. What appears as play fighting between young cats (or any carnivorous, predatory mammal) is actually a learning adaptation that teaches them survival skills.

Konner (2010) also notes that biologists have long realized that the smartest mammals and those with longer lifespans, tend to be the most playful. You can watch children of any age engage in “rough and tumble play” and see that it is quite different from any aggressive action of real fighting – yet physical, developmental, and motor skills are also developing in the process. Even beyond the important development of physical coordination and motor skills, play of all kinds

helps humans and other species learn to account for and handle unexpected events, establish and practice social relationships, self-assess and consider risks, stimulate mental development, and practice imagination and creative adaptation.

It is this “rough and tumble play” that is commonly associated with young children. At school, this is the play that children participate in during recess or “breaks” from learning. This type of play is usually structured by the involvement of children in a variety of games. Games (be they card games, board games, video games, or playground games) offer children a limited terrain with rules that have to be followed. While valuable, this is a narrow version of play. Children need to experience a risk-free play that urges the pushing and subverting of boundaries. Watching children play reveals that much of the dialogue between children during play is about what is “permitted” and “not permitted.” Play being unmoored from reality allows us to hypothetically explore the consequences of our actions, to test the boundaries of our influence. This is the fundamental difference between play and games. Though we play games, not all that we play can be called a game. Our notion of play is far wider than that of a game. Open-ended combinatorial creativity is what gives play its pedagogical power.

## Playing and Learning

Swiss psychologist Jean Piaget’s observations about the centrality of play in children’s cognitive development, has informed a strong awareness of play’s value in education. For example, Root-Bernstein & Root-Bernstein (1999) describe three different functions that play can offer as a habit of mind, all of which support the engagement required for what we have called deep play. *Practice play* contributes to the development of some sort of skill set; *symbolic play* can involve meaning making and the use of objects in ways other than their original intent; and, finally, *game play* involves creating rules dictating

the parameters of play, transforming helter-skelter play to a more purposeful activity. Certainly these elements are not mutually exclusive, but each offers a different mental exercise from which connections are made, and within those connections creativity can be fostered.

Piaget was not alone as one of the foundational figures in educational psychology to value play. John Dewey (1934) was a strong proponent of creative learning. In fact, Thomas and Brown (2009) note that Dewey found great importance in the transference of imagination between work/learning and play. Vygotsky (1967; 1978) placed tremendous value on the significance of childhood play as being essential to the development of creativity and complex thinking among adults further on in life. Imaginative play is, in this way, crucial to cognitive development.

Playing is an important way in which children build an understanding of the world around them. Children make sense of their place in the world by engaging in open-ended play that allows them to practice using parts of the world they are familiar with on their own terms (Alman, 2003). This exploration and discovery begins at a young age, and as play expands in different ways, so to do its benefits.

Play not only helps children put together the pieces of their world, it promotes social and emotional development so that their understanding of the world allows them to interact successfully with their peers. The importance of socio-emotional ability seems reason enough to encourage play; however such skills have also been connected with academic success (Ashiabi, 2007), the very cause for which play has been sacrificed in schools. Michele Root-Bernstein echoes and extends the argument for bringing play back into schools, citing the ability to think creatively and use imagination as a prerequisite for the kind of innovation that cannot possibly occur when classrooms are based on standardized testing and accountability (Root-Bernstein, 2014).

In early childhood, work and play have no distinction – climbing stairs

can be a thrilling activity for hours – a fun and not-coincidentally, skill-building experience (Alman, 2003). However, these begin to part ways at an increasingly young age. The shortening of recess-time and scaling back of programs such as music and the arts reiterate a single-minded focus on study (Singer, Golinkof, Hirsh-Pasek, 2006). This not only hampers the exploration, learning and development associated with play, but likely has the unfortunate effect of creating problematic dichotomies without overlap: work vs. play, school vs. fun, thinking vs. not, and so forth.

## Creating Worlds through Creative Play: Worldplay

In her recent book, *Inventing Imaginary Worlds*, Michele Root-Bernstein (2014) traces the impact that the creation of imagined worlds can have on their inventor throughout their life. While this book focuses on one highly developed branch of play, it is representative of a broad movement to bring play back in the discussion relating to children in school (Craft, McConnon & Matthews, 2011). Observations from Root-Bernstein's own daughter's construction of a pretend world called "Kar" help support her detailed profile of this phenomenon of worldplay and the benefits it can offer its creator.

Worldplay is a particularly in-depth, imaginative type of play. It extends beyond casual make-believe into the creation of a specific and unique world that is consistently built upon over time and develops a complex cultural identity. As such, worldplay offers its creator a unique interpretation of reality that can be influential throughout adulthood. Root-Bernstein discusses several famous examples of worldplay; the 19th century creation of Glass Town by the Brontë siblings, C. S. Lewis' Animal-Land, and more – worlds developed not only by authors, but neurologists, zoologists, artists, psychologists, musicians, scientists, philosophers and actors (Root-Bernstein, 2014).

To better understand the ways in which worldplay influences the maturation of the child-creator, Root-Bernstein reached out to MacArthur "genius grant" fellows to survey their childhood pastimes. To offer a comparison to this elite group, she also surveyed undergraduates at Michigan State University about their experiences with imagination and childhood play. Root-Bernstein found that worldplay is more common than had been previously thought and seems to be linked to mature creativity – Fellows were twice as likely as the average undergraduate to have engaged in worldplay.

Confirming the correlation between worldplay and adult creativity, the reasons for this relationship were more closely explored and determined to lie in the many different elements that compose worldplay. The construction of knowledge, problem finding & solving, prolonged play, invention of culture, creative behaviors, and imaginative skills that are involved in creating an imagined land carry through to complement adult skill sets in a creative way (Root-Bernstein, 2014).

Using Robert Louis Stevenson as a case study, Root-Bernstein traces the transition from a personal and private play to public creativity. In doing so she argues for the importance of three experiences: discipline-specific training, continued play in adulthood, and the joining of play to work. Even with these experiences, Root-Bernstein (2014) cautions that self-motivation is an important qualifier and the ultimate factor in the translation of creative potential to creative ability. As Root-Bernstein observes, play "...can and does function in ordinary and extraordinary ways as a cognitive strategy for learning, discovering, and creating throughout a lifetime" (Root-Bernstein, 2014, p. 50).

## Playing at Work, Working at Play

The key to creative play (as articulated by Chateaubriand) is that it integrates fun and work rather than

compartmentalizing the two between personal and the professional spheres. In the action of play, the personal self can blend into professional practice, enhancing engagement with ideas, making work and learning more fun, and leading to better insights through a willingness to explore ideas. If we were to view play and work/learning as two opposite poles of a spectrum, we would arrive at an extremity of both: superficial play or a relatively straightforward task-orientation at work. But this kind of dichotomy of play *or* work is not helpful to either. It is their overlap from which well-informed innovation comes. Blanchard and Cheska (1985) have argued that a better distinction than this false dichotomy may be between play/not-play and work/leisure. If work has intrinsically motivating value (and external rewards are not the prime motivator), it can often be akin to play.

Play facilitates the coming together of things that might not otherwise find each other. Each of the trans-disciplinary skills that we have described through this series of articles also does this in its own way by allowing people to see, think about, and make connections between different things – toward the production of something new. Play is perhaps more open-ended than that, in that the initial creative goals are not always clear, other than a sense of curiosity and fun directed toward "what if?" creation. With the nature of play being slightly "wilder" in its openness, it is perhaps unsurprising that many great innovators have creative and sometimes unexpected "breakthrough" moments during times of play.

For example, famous scientist Richard Feynman quite purposefully included play in his work, and vice-versa, work in his play. Out of the wobble of a plate thrown in the cafeteria arose some spontaneously playful equation writing. And, because his work and play informed each other, this inspired a train of thought which eventually led to his work in electrodynamics (Root-Bernstein & Root-Bernstein, 1999).

Playful attitudes need not extend to casual plate throwing, of course. Tales of Feynman's pranks make him sound like an alarming force of nature – games and genius combined. It is not that play need be limited to more brash and outwardly-directed personalities. It is simply that such displays of play make it particularly obvious how play enhances creativity: through openness to new ideas. The openness of children to fantastical ideas and leaps of logic is known. But beyond that, it is a well-documented phenomenon in psychometric assessments of creativity, that a person's openness to new experiences and ideas is one of the strongest indicators of creativity through life (Feist, 1998). In fact, one of the traits most often associated with creativity, on the Five Factor Model of personality, is openness (King, Walker, & Broyles, 1996) – which tends to both encourage and be stimulated by a sense of play and curiosity.

Within the field of teaching, Henriksen (2011) and Henriksen and Mishra (in press), found that among the most successful and creative teachers in the country (a subset of National Teacher of the Year winners/finalists), one of the most common traits associated with their teaching success and creativity, was a “creative mindset”, which the teachers termed as an “openness” to ideas and experiences. Openness to new ideas alone cannot inspire creativity. It must be backed by ability, other skill sets, and knowledge of content within disciplines. As a trans-disciplinary skill, play is complex: it builds upon other skills and is enhanced by an understanding of many things. Musicians for example, must have a basic skill set - they will be more likely to extend boundaries if they develop an ability to recognize patterns.

It is clear through all of this that we are making a case for the value of play in learning, in creativity, and as a core thinking skill that promotes new ideas and motivates growth and improvement. After considering the necessity of play in learning and development, and in creative production across the lifespan, let us turn to some examples of play in education and teaching.

## Exemplifying Play in Creative Education

Educators have long valued play as a motivating factor for children. Particularly in elementary school, the importance of childhood play is well established. But as we have suggested, play is valuable toward thinking across the lifespan, and therefore can be implemented in content and subjects across K-12, in various pedagogical methods and activities. Given the way that play can weave across many disciplines, it is important to consider it in K-12 curriculum at multiple levels.

In our Masters in Educational Technology program at Michigan State University, we have a course entitled “Creativity in Teaching and Learning”. In this course the students (who are also practicing teachers) work on developing their facilities with integrating creative trans-disciplinary skills into their work. As they include these skills in their own classroom practices and lesson designs, they are also trying to give their own students opportunities to practice this. We see much variety in how play can be woven across subject matter teaching and age groups. We offer a few examples of this, drawn from language arts, music, and mathematics.

One high school language arts teacher worked play into a lesson on poetry. She began by showing her students a YouTube video to explain the basic concept of onomatopoeia. Once they understood the concept, she did a lesson that encouraged them to “play” with creating their own visualizations of it. Some of her examples included having students create a talk show in which the host interviewed each type of comma, to make the grammar a little more interesting. They also created parodies of nursery rhymes in which Jack and Pete go down the street to get more minutes on their iPhone, and many more funny and playful instantiations of the idea. This teacher noted that:

They are laughing as they come in and tell me, “Last night was such a debacle! I

left my note cards at home and am now faced with such a conundrum!” Using two of our vocabulary words in a joking way, but that also tells me that they have learned them. I want to make my classroom a place where they can learn and grow, but are comfortable trying out new things.

In this activity students are having fun and trying new things, but also learning content and creating. This exemplifies the essence of play. The teacher structured an activity in which her students could take a concept from the poetry content (onomatopoeia) and play with it – learning creatively.

In another activity, a music teacher had her students create presentations on “musicality” by playing and by combining ideas from different disciplines. In her activity, the students were put into small groups. They selected two very unlikely pieces of music from their iTunes library to mash together in GarageBand, iMovie, or any app of their choice. The lesson asked them to work on the music ideas they had been learning, by mapping the pieces onto one another and weaving them together like an “incredible ballet play.” The only requirement was that the pieces in the creative production had to be from different genres, musical periods, or cultures. After this, she asked them to play around with their creation a bit further. They were asked to bring in some aspect of another discipline to transform the music mash-up. She prompted them with,

What comes to mind when you listen to your mash-up? For example, you may want to incorporate a line drawing using the techniques from an art class. Or perhaps a mathematical waveform might be appropriately integrated into your work to show musical trends? We're looking for collective improvisation and innovation, as we observed with the birth of jazz music – just play with your creation and we'll reflect on what we learned.

Again, we can see the essence of play here, reflected in the fact that the activity was open-ended and exploratory – playing with ideas and musical concepts, and combining them in a way to try to create or learn something new.

Finally, play can often involve a sense of invention from the teacher herself, as in the example of a math teacher who created a game to teach her students math concepts, based on the classic game Tetris.

As her students were reviewing the properties of odd and even numbers, the textbook showed some pictures of tiles, some with pairs and some without (both odd and even groups of squares). She mentioned how this reminded her of the game Tetris and how addicting the game can be. So, for her play lesson, she chose to remix the game Tetris with new directions, aimed at helping students learn the math ideas. She noted that:

The aim of this playful game is to have students understand the theorems for odd and even numbers. Students who are deep in play will understand that they need to pick shapes which fit and give them the appropriate odd or even number, to give them the most points.

Games that engage the mind and allow people to interact with ideas have value in learning through play. But even more important is the added element of seeing the teacher practice some playful remix herself, which further models creativity and flexibility with ideas for students – showing them that they too can play with the structure of what already exists. Amabile (1996) has noted that teachers who model creativity and flexible thinking for their students help them tap into and develop these thinking skills for themselves.

## Conclusion

Over the course of this article, we have explored the value of play from multiple angles. It is clear that at its core, play has extensive value for thinking across disciplines, and

is essential to the trans-disciplinary framework for creative thinking. Creative people in math and science, from Richard Feynman, to Alexander Fleming, to Albert Einstein, all demonstrate creative play in the way that they play with ideas to break through unassailable boundaries – diverging from more rigid views on how mathematicians or scientists operate. In music, the arts, and other disciplines, the value of play is essential for trying out new possibilities in creative work, and coming up with new, remixed ideas.

But beyond the trans-disciplinary elements it is also clear that as a skill for thinking, learning, and development, play is essential. Evolution has primed us to learn through play. In developmental, social, and cognitive terms it has great value that carries into adulthood. The creative impulse to play benefits us in personal ways, but also in societal ways – in the social relations and creative work/artifacts that are discovered by playing with ideas and things.

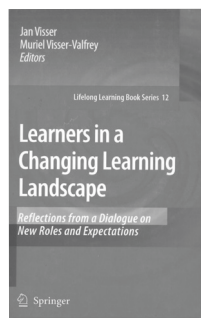
Given all of this value in the cognitive and creative skill of play, it is a shame to see it being slowly removed from the lives of young people. In K-12 environments across the U.S. the time allotted for play, or outside recess, has steadily diminished in recent years (Pellegrini & Bohn, 2005; Slater, Nicholson, Chiqui, Turner, & Chaloupka, 2012), as have the opportunities for teachers to integrate play and fun into the content they teach. Many still do, though it becomes increasingly difficult, as play is squeezed out due to mounting demands of heightened content requirements, standards-based learning, teaching-to-the-test, and academic competition. As the arts, music, physical education, and a general sense of (and time for) play start to vanish, we must ask ourselves what it is that we value. In a society that requires innovative and imaginative thinkers to deal with complex issues, play is needed for students to learn, grow and see new possibilities and opportunities. Without creativity, we stagnate, and without play we cannot create.

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# *Learners in a Changing Landscape: Reflections from a Dialogue on New Roles and Expectations*



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