Extending the *Reggio Emilia* Educational Approach to Creativity Support *Environments*

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ABSTRACT
Intelligent Systems can effectively bridge the wondrous world of childhood and the adult world of rules, goals and expectations. This paper explores the possibility of an *embodied* child-computer interaction that cultivates creativity – a core value of the successful adult in an increasingly digital society. We draw specifically on the *Reggio Emilia* method of education, not by adding to it PCs (as has been done, with mixed results), but instead, by respecting its focus on haptics – on the handling of physical things as a way of learning – embedding computation in the very fabric of the physical environment. We call this embodied system a Creativity Support *Environment* to emphasize the role of the physical environment as, itself, a "teacher" of creativity.

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Computer Support Tools; Children; Creativity; Intelligent Environments, Architecture, Human Factors, HRI.

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H.1.2 User/Machine Systems, J.5 Arts and Humanities, K.3.1 Computer Uses in Education

General Terms
Theory

INTRODUCTION
One of the greatest challenges facing public education, argues State Governor Kathleen Sebelius, Chair of the *Education Commission of the States*, is preparing students for "the globalization of a digitized workforce" which "requires an intensive focus on advanced skills such as innovation, creativity and design – the very same skills schools [in the United States] are asked to forfeit in exchange for continued federal funding" [6]. While video games are regularly criticized for containing inappropriate content for children, video games have also garnered praise for cultivating in children some of the attributes demanded by a global, digitized workface: creativity, self-esteem, and a heightened capacity for problem-solving and community building. Whatever their alleged vices and virtues, the imaginary world of the video game nevertheless remains far-removed from the sometimes less inspired, more

regulated socio-cultural and physical environments in which they are played. With maturation, children are expected to transition from the imaginary world of toys and video games to the "real" world of adulthood.

How can Intelligent Systems more effectively bridge these worlds so that children carry to adulthood a way of seeing, reflecting and making that retains the wonder of childhood within the real-world context of rules, goals and expectations? How can intelligent systems research lead to the development of new technologies to support creativity? What would such a technology look like?

Alissa N. Antle begins to answer these questions in a recent article in *interactions* [1], arguing for "embodied child-computer interaction" and citing, as inspiration, Paul Dourish's *Where the Action Is*. "Meaning is created through restructuring the spatial configuration of elements in the environment," argues Antle [1]; "a highly structured environment does not provide opportunities for restructuring and thus limits knowledge construction. What is required is an environment…that supports multiple spatial configurations" [1].

But while the literature regarding children and creativity is substantial, the literature regarding the importance of the learning environment is ample, and the literature on creativity and information technology is growing, the literature on the important effects of the *interactions of these three domains* has not yet emerged. Our research in child-computer interaction seeks to fill this gap by focusing on the impact a reconfigurable, computationally-embedded physical environment can have on fostering children's creativity.

EXPANDING THE REGGIO METHOD
Our research is grounded in progressive educational thought, which suggests that the learner should be at the center of the educational experience. This makes the informal learning environment of, say, the museum a well-chosen setting. In the museum, children take a formative role in their learning by exploring objects, ideas, and environments in ways that foster imagination and creativity. As Bruno Munari, an architect aligned with the *Reggio* method urges, "Don't ask children to select from a group of leaves the leaf they most prefer and have them design or paint it in whatever means; the nature and form of that particular leaf suggest the particular means for

capturing it" [4]. It is the abstract approach to learning inferred by Munari's words that makes *Reggio Emilia* an apt theoretical underpinning for Creativity Support Tools.

The *Reggio Emilia* approach to education is a world-renowned, child-initiated inquiry method that stresses the relationship between children and the environment, collaborative learning, and inquiry centered projects [3]. Named for Reggio Emilia, the northern Italian city of its origins, the *Reggio* method stresses collaborative learning, inquiry-centered projects, and – most particularly – *the physical learning environment as itself a "teacher" within the creative process*. "Creativity is not just the quality of thinking in an individual," writes Carla Rinaldi, a key *Reggio* figure, "it is also an interactive, social project. [Creativity] requires a context that allows it to exist, to be expressed, to become visible" [5].

An important tenet of *Reggio Emilia* philosophy is that the child is encouraged to develop individual understandings of the world and its objects through active explorations [5]**,** as opposed to more conventional static, formal, and didactic instruction. The *Reggio* philosophy emphasizes the importance of children learning to work together in collaborative fashion on projects that are interesting, relevant, and challenging to them [5]. In the *Reggio* approach, the physical environment in which children learn is central to fostering creativity and imagination [5]. For the *Reggio Emilia* method, *the environment is the essential piece in creating educational experiences fostering creativity in a social, collaborative context*.

Yet, the *Reggio* approach shares one notable shortcoming: *an inattention to the role of information technology in children's educational experiences and in children's lives today*. While the *Reggio* philosophy is focused on the physical environment [5], children today live much of their lives interfacing with technology. In a world predominated by *ipods*, cell phones, video games, instant messaging, and music downloading, children seem most comfortable in the two-dimensional world of cell phone displays, computer monitors and television screens. While there is no question that today's children are more technologically savvy and knowledgeable than those of any other generation, there are concerns that the two-dimensional world that they find comfortable does not reflect creative applications of IT in a world that is at once digital, physical and social. Additionally, there are concerns that important contributions to fostering creativity offered by the *Reggio* approach are today lost, due to *Reggio*'s inattention to the realities of children interacting with the accessible, ubiquitous IT of the 21st-century world. Yet, *Reggio* reminds us that the "*environment is teacher*," helping us to develop social skills, and creative and imaginative dispositions that are central to today's children and our nation's future. Our concept of the "Creativity Support Environment" takes these concerns seriously by developing

a technologically sophisticated, programmable, robotic, physical environment for young people to engage, individually and collaboratively, thus joining the strengths of the *Reggio* philosophy with the reality of children living in today's complex Information World.

In conceptualizing and realizing Creativity Support Environments, we recognize that creativity "arises from the synergy of many sources and not only from the mind of a single person" [2]. Taking its cue from research efforts in IT and HCI, Creativity Support *Environments* further the promise of Creativity Support Tools by developing, specifically, a reconfigurable, *physical environment* to support creativity. No other research combines architectural design and a child-reconfigurable environment to bridge the two-dimensional digital world and the three-dimensional physical world. Creativity Support Environments draw together the IT world inhabited by children today and progressive educational philosophy that emphasizes the primacy of the physical learning environment.

The 21st century world is a world in which the digital and physical can come together, seamlessly. Providing children with opportunities to stretch their creative and imaginative process through digital means in a programmable physical environment is an important, even necessary undertaking. The reconfigurable nature of Creativity Support Environments make them, in essence, co-adaptive, allowing environments and their inhabitants to change and develop through iterative interactions.

Creativity Support Environments are physical environments aiming to cultivate creativity across children. In our increasingly digital society, the impact of such Creativity Support Environments is potentially far-reaching; for as Bruno Munari wrote, "People lacking creativity will be unable to respond to the inevitable changes in life" [4].

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