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Preface

Learning sciences research explores the nature and conditions of learning as it occurs in educational environments, broadly construed. The learning sciences field draws upon multiple theoretical perspectives and research paradigms in order to understand and improve human learning, cognition, and development. Over the last two decades the learning sciences community has developed powerful technological tools, curricular interventions, theories, and methods for understanding and improving teaching and learning as it unfolds in naturalistic contexts.

Learning sciences takes an interdisciplinary approach to the study of learning, cognition, and development in real-world contexts. Learning scientists believe that any investigation of teaching and learning must consider context, cognition, and learning architecture, which we treat as inextricably intertwined. All who are interested in the study of learning in context and the design of learning environments should find the work in these Proceedings to be of interest.

While learning scientists can present rich accounts of learning in complex contexts, convincing policy makers, teachers, and other researchers of the theoretical and practical value of our work; it is not a straightforward process. We must show impact at the local level, while at the same time working to advance claims that have more general value. In other words, we must make clear that the learning sciences make a difference.

Toward this end, the *Seventh International Conference of the Learning Sciences (ICLS 2006)* is explicitly focused on the theme "Making a Difference." Much of the work in these Proceedings demonstrates how our work is making a difference: to students, teachers, schools, and policy makers; to research approaches and methods; to theories and models of learning, instruction, and assessment. Each proposal in these Proceedings was blind reviewed by three independent reviewers to ensure high quality work. We hope that others will find the lessons shared in these pages relevant to their work.

Acknowledgements

Organizing this meeting was a substantial undertaking. Receiving and reviewing proposals, assembling the Proceedings, and organizing the actual conference required many hands. There are many people we owe our sincere thanks in making this year's conference a reality.

We offer special thanks for the tireless hours and work of Melissa Goodnight and Karla Frownfelter in organizing these Proceedings. Similarly, our designer Paul Whitener also made many last-minute changes and developed the artwork. Their hard work has made the editors and the contributors look their best.

We would like to thank members of the Indiana University community for their support, both personnel and monetary. These include IU Learning Sciences Program and Program Head, Dick Lesh; the IU Center for Research Learning and Technology; IU School of Education and Dean Gerardo Gonzalez; IU School of Informatics and Dean Michael Dunn; IU Office of

International Programs; IU Vice President of Research, Michael A. McRobbie; and IU Office of the Chancellor.

Putting on a conference for the first time can be an overwhelming and complex enterprise. Mary Morgan of the IU Conferences office has been an amazing resource and help in juggling all of the demands of a conference co-chair. We would like to extend our sincere thanks for her tireless work, patience and persistence. We would also like to thank IU Learning Sciences Professor Tom Duffy for his initial involvement in organizing the conference.

The National Science Foundation has been a consistent supporter of past and current meetings the ICLS. We would like to once again recognize the foundation and program officers (particularly Elizabeth VanderPutten, Robert Sherwood, and Larry Suter) for their commitment to the field through the significant support of *ICLS 2006*. Special recognition should be mentioned for their support of graduate students and early career scholars. Their forward thinking and support will pay great dividends in the quality of our future.

This is the first ICLS that has had the benefit from a fully formed International Society of the Learning Sciences (ISLS) organization to support and guide the development of the conference. In particular, we would like to thank ISLS members Janet Kolodner, Roy Pea, Claire O' Malley, Nancy Songer, William Sandoval, Chris Hoadley, Danny Edelson, and Cindy Hmelo-Silver for their help and guidance. We would also like to acknowledge the suggestions and help of other ISLS members, particularly our international colleagues, including Paul Kirschner, Sanna Jarvela, Bronwyn Stuckey, and Hans Spada.

We would also like to give a special thanks to the *ICLS 2004* chair, Yasmin Kafai, in helping us plan for the hills and valleys of conference work. Her wisdom in handling the many issues of the *ICLS 2006* has been much appreciated. We hope to do the same for the *ICLS 2008* chairs.

Finally, we would like to recognize the many individuals who reviewed the submitted proposals for all their hard work and the contributors that make the ICLS an exciting conference. We are sure that their creativity and scholarship will make the *ICLS 2006* and these Proceedings a significant contribution to the Learning Sciences community.

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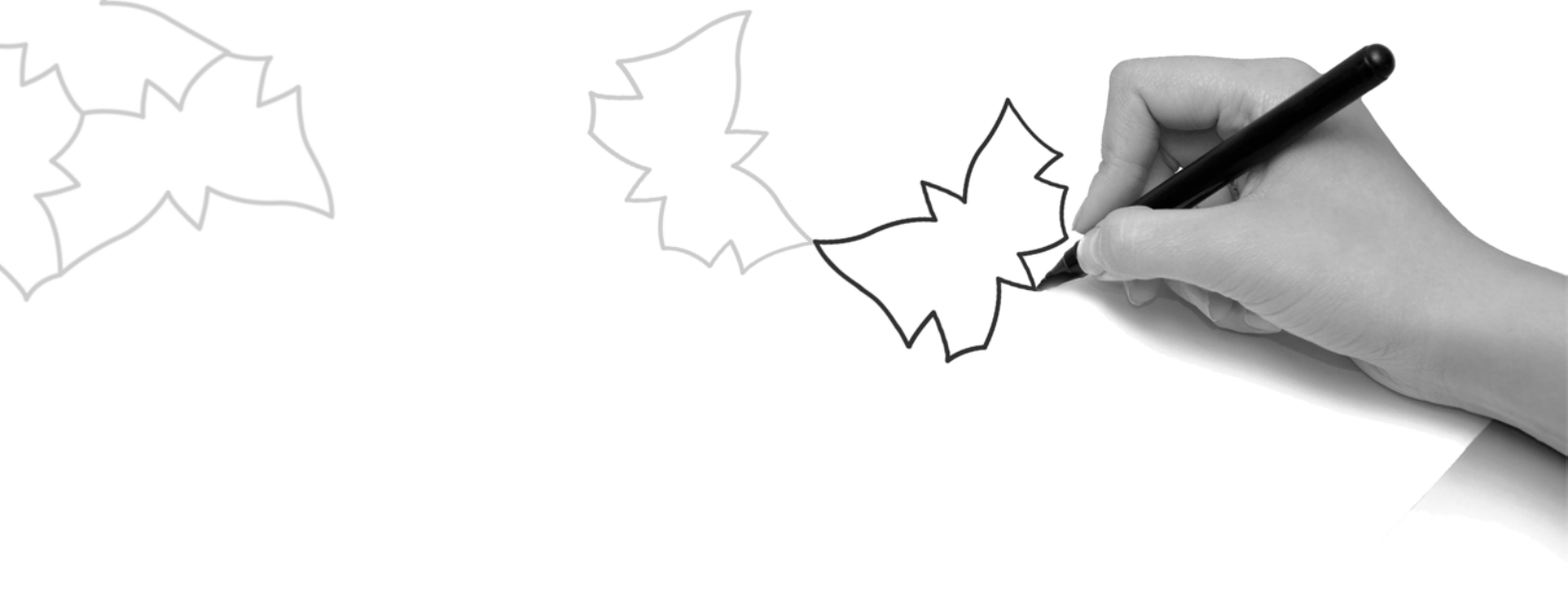

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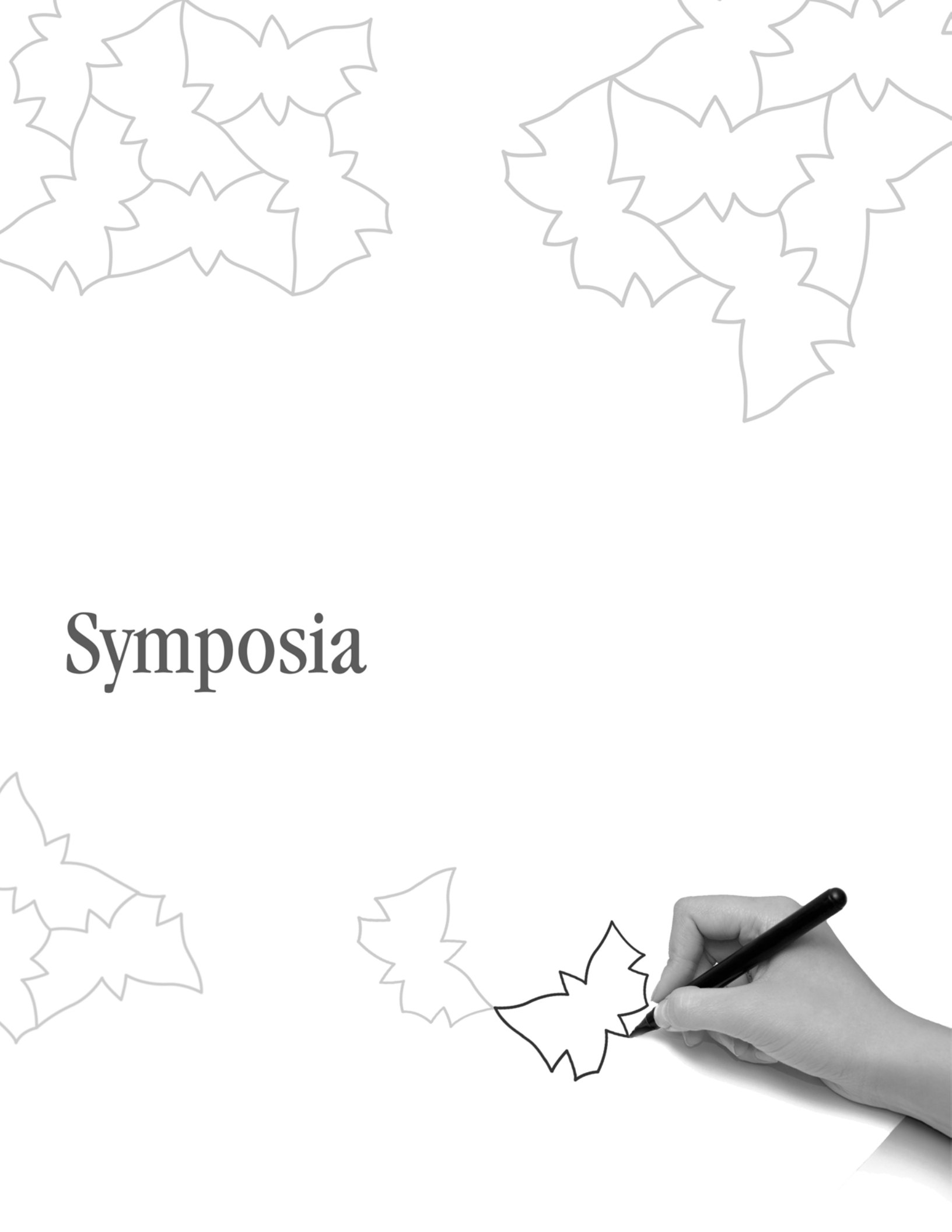

Creative Codings: Investigating Cultural, Personal, and Epistemological Connections in Media Arts Programming

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Abstract: The focus of this poster is to turn our attention to the arts as an understudied area in the learning sciences and examine how studying the learning of arts and programming can open new avenues of research. Results from a case study analysis suggest that appropriation builds on multiple connections: cultural connections such as referencing popular iconography, personal connections such as including family pictures, and larger epistemological connections to larger bodies of knowledge.

Introduction

Learning science researchers have paid little attention to the field of arts education as the more prominent focus has been on science, math and to a lesser degree, social studies and language arts. Among a number of reasons that can explain this absence of interest is the lack of new technologies in the arts education curriculum. Recently, the Arts Education Partnership (AEP) issued a call for research to further investigate 'New Technologies and Arts Learning,' noting that "[n]ew technologies…are changing the nature of arts education" (AEP, 2004). The intersection of arts and technology (called "media art" here) is a relatively new avenue of research that has implications for both the arts and computer sciences, and more generally, the learning sciences. The focus of this poster is to turn our attention to the understudied area of the arts and examine how the learning of arts and programming can open new avenues of research.

A design studio found at a community technology center in South Central Los Angeles presents an interesting opportunity to explore the ways in which youth culture are already making use of new media as tools for expression, particularly capitalizing on software that promote computer programming. The studio and its design software were created with a constructionist theory of learning in mind, which poses that people learn best when they are active participants in design activities and share their design with others (Papert, 1980). The findings outlined here build on one of the main concepts of constructionism, *appropriation*, which posits that learners construct knowledge by making it their own. Resnick (1996) points to two constructional-design principles, which allow the creator to appropriate knowledge through the making of (1) personal connections (i.e., connections to outside interests, past experiences, or prior knowledge) and (2) through epistemological connections (i.e., the ability to connect to important domains of knowledge). We add a third component to this analysis, (3) cultural connections (i.e., connections to larger cultural context). The results suggest that youth leverage previous knowledge in the design process, appropriating the design software through personal, cultural, and epistemological connections to their work.

Methods

Over the past year, we have documented design activities that incorporate computer programming at a design studio with predominantly Latino/a and African-American youth ages 8-18 through extensive ethnographic field note taking (Creswell, 2003). Young artists created a variety media arts projects such as animated stories, Videogame art, and interactive or playable art using pop culture images and sounds. Using a comparative case study approach, the artist in this study was selected from over 30 other case study participants based on the prototypical nature of her work and her persistent interest over a period of multiple weeks in using computer programming for expression. Field notes were open and axial-coded for themes derived from the theoretical framing.

Findings

For this analysis, we draw from an example of a "dance video" called "k2b," created by a thirteen-year-old female software designer, who modeled the piece after a Gwen Stefani music video. When the viewer presses a start button, music begins to play, characters dance on the screen, and the background changes between several different

images. At the start of the project, the first-time designer had an existing interest in pop music and chose to use "Hollaback Girl" as the basis for her music video. As a result, she chose images and music that reflected her perception of pop culture and music videos. The use of a shared cultural context (i.e., the pop music video) resonated with other members of the design studio. During the design process, members would gather behind the designer to watch the "k2b" video, being drawn in by the music. In addition to her interpretation of the well-known music video, the designer made additional personal connections to the piece such as choosing to insert both a picture of herself and her younger brother as two of the dancers in her music video.

Undoubtedly, when designers create media art they are connecting to many different bodies of knowledge, here we focus on connections to the traditional arts and computer programming. The aesthetics of the images played an important role in the design process. In the search for "k2b" images, it was less important to her to insert an image of herself, as it was to find one that fitted her perception of how a music video should appear, underscoring the importance of understanding and emulating contemporary art and pop culture aesthetics in media art production. Additional connections to traditional arts include the designer's attention to the choreographing the dancers. "k2b" required precise timing and unique dance moves of each of the characters. During these design moments, programming took a back seat to design considerations of when characters should enter and exit the stage and how each of the dancers should move—roles that seldom assumed by youth in the traditional arts. The designer also made connections to computer science. This is exemplified by the designer's use of programming concepts like looping constructs, conditionals, and assembling programs out of base components — concepts that are even new for novice computer science majors. In addition, she was able to repurpose code in a meaningful way and accomplish artistic design goals for the piece by taking pieces of code and creatively recombining them for new characters.

Discussion

This case study illuminates how programming within an arts context is very different from context of math and science. Programming in this context is less about code and more about personal expression. While case studies of work in the design studio give us only a partial understanding of the larger design culture, they do provide us with an understanding of how individuals are able to repurpose the design environment for personal expression. The advantages of this work are at least threefold: (1) Media arts have implications for broadening the participation and applications of traditional programming courses in K-12 which tended to focus on mathematics and science; (2) Media arts are an essential component to artistic expression in a digital era—a tool that has an arguably increasing importance for youth and society at large; and (3) these projects emphasize graphic, music and video — media that have been found to be at the core of technology interests for youth and thus could provide new opportunities to encourage and broaden participation of youth from under-represented groups to become designers and inventors with new technologies.

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