Chapter 3

Exploring African American Middle-School Girls' Perceptions of Themselves as Game Designers

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ABSTRACT

Computational algorithmic thinking (CAT) is the ability to design, implement, and assess the implementation of algorithms to solve a range of problems. Supporting Computational Algorithmic Thinking (SCAT) is a longitudinal project that explores the development of CAT capabilities by guiding African American middle-school girls through the iterative game design cycle, resulting in a set of complex games around broad themes. This paper explores African American middle-school girls' (called SCAT Scholars) perspectives of their SCAT experience and perceptions of themselves as game designers.

INTRODUCTION

Jeanette Wing (2006) defines computational thinking as "a way humans solve problems…" This research makes explicit a critical aspect of computational thinking through its focus: the design, development, and implementation of algorithms to solve problems. An algorithm is defined as a well-ordered collection of unambiguous and effectively computable operations that, when executed, produces a result and halts in a finite amount of time (Schnieder & Gersting, 2010).

Computational algorithmic thinking (CAT) is the ability to design, implement, and assess the implementation of algorithms to solve a range of problems. CAT makes explicit a critical aspect of computational thinking through its focus of understanding how learners identify and understand a problem, articulate an algorithm or set of algorithms in the form of a solution to the problem, and evaluate the solution based on some set of criteria. CAT focuses specifically on how the human, as computing agent, designs, implements, and assesses an algorithm (or an "abstraction of a step-by-step procedure for taking input and producing some desired output") or set of algorithms to solve a problem. CAT is focused on the algorithms designed, adapted, implemented, and discarded by the human (as computing agent) on the journey toward choosing the "right" abstractions. (Wing, 2008; Thomas, 2008). CAT is an important scaffolded on-ramp as students develop more advanced CT capabilities and apply CT to solve problems that are more constrained and require greater and greater expertise. CAT lies at the heart of Computer Science, which is defined as "the study of algorithms" (Schnieder & Gersting, 2010). CAT embodies the ability to think critically and creatively to solve problems and has applicability in a range of areas from Computer Science to cooking to music (ITSTE-NETS, 2007; Polya, 1973; Wing, 2006; Wing, 2010).

SCAT is a longitudinal between-subjects research project exploring how African American middle-school girls develop CAT capabilities over time in the context of game design (Thomas, 2014). SCAT is also a free enrichment program designed to expose middle-school girls to game design. The goals are:

1. To explore the development of CAT capabilities over three years in African American middle-school girls as they engage in iterative game design, and
2. To increase the awareness of participants to the broad applicability of CAT across a number of industries and career paths.

Spanning three years, participants, called SCAT Scholars, develop CAT capabilities as they engage in the game design cycle to design more and more complex

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