**STARTING AFTER SCRATCH**

TEACHING TEXT-BASED CODING AFTER GRAPHICAL LEARNING TOOLS

A Master’s Thesis or Doctoral Dissertation Presented to the Faculty of

the Department of Computer Science

Villanova University

In Partial Fulfillment

of the Requirements for the Degree of

Master of Science in Computer Science

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April, 2013 (of completed thesis)

Under the Direction of

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The reference material contains a bibliography or a list of references arranged

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# 1. Introduction

1.1 Problem Statement

1.2 Purpose of Study

## 1.3 Importance of Study

President Obama on Science and Engineering in a Google+ Hangout - <http://www.youtube.com/watch?v=Ka-C7yBu_dE> – “math and scince is part of your overall educational experience, we don’t want youy to be intimidated by it.”

President Obama on Computer Programming in High School in a Google+ Hangout - <http://www.youtube.com/watch?v=PClfyIbIr5Q> -

1.4 Scope of Study

## 1.5 Rationale of Study

### 1.5.1 Choice of Scratch as the Base Language

For my study, I wanted to build on a strong basis. I wanted to meet several criteria when choosing a visual programming language to build on. I wanted a language that has an effective pervasiveness in pre-college school students, especially in the middle schools. Most preferably, one that already had a large grasp on this age group. The language needed to be powerful enough to bring its users to a level where they are ready to advance to less restrained programming environments. Finally, the language I chose as the base must effectively and quickly teach the programming mind-set that allows programmers to parse ideas into language semantics.

Several visual programming languages meet these criteria.

Twine [http://www.gimcrackd.com/etc/src/] is a graphical tool used to create multi-branching stories, often presented as text adventures. Users create blocks of texts linked by actions to previous blocks, which can then be built into an interactive interface. Obviously, this is very limited in its scope, but it was chosen to represent all such flow-chart styled programming languages.

Alice is a visual programming language that allows users to create interactive 3D systems. This is accomplished by arranging nesting code chunks (resembling draggable rectangles) and pre-programmed macros (“Let mouse move any object” [Alice Web site, “A Demonstration of Alice”]) into a desired order. Originally conceived in 1995, Alice was designed for rapid prototyping for virtual reality systems [Pausch, 1995]. It was later revised by Matthew Conway into a learning system targeted to 19-year old students, your usual college freshman. It was designed to teach object-orientation and basic programming constructs. Alice has even integrated different syntaxes into its interface, allowing it to be friendlier to new users or look more like Java, in an attempt to “bridge” the gap between itself and Java [Dann, 2011].

Scratch is a visual programming environment developed at the MIT Media Lab. Color blocks can be snapped together to influence the behavior inside of a “stage”, which updates live with every code update. First developed in 2003, “the original design of Scratch was motivated by the needs and interests of young people (ages 8 to 16)” [Maloney, 2010]. Scratch’s interface naturally teaches objects, basic variable types through shapes (strings, numbers, Booleans), and parallel operations. Since its release, it has grown into a highly public programming environment[Scratch Web site] and was ranked 29th in 2012 on the TIOBE list, the highest ranked visual programing language [TIOBE, 2012 <http://www.tiobe.com/index.php/content/paperinfo/tpci/index.html>].

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## 3.2 Data Gathering Method

## 3.3 Database of Study

## 3.4 Validity of Data

## 3.5 Originality & Limitations

## 3.6 Summary

# 4. Presentation of Findings

4.1 Sub-heading

4.2 Sub-heading

# 5. Conclusions

# 6. Future Work

# 7. Bibliography

The reference material contains a bibliography or a list of references arranged

alphabetically and any other pertinent sections, such as appendices. Chicago Manual of Style