Alice First: 3D Interactive Game Programming

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ABSTRACT
For introductory programming courses, we recommend teaching Alice as a precursor to teaching object-oriented languages such as Java. This presentation describes and demonstrates the approach of a newly published workbook that uses a highly motivating story-telling 3D virtual world interactive game design and development pedagogical approach. Students create animated movies and in the process learn object-oriented programming fundamentals.

Categories and Subject Descriptors
K.3.2 [Computers and Education]: Computer and Information Science Education—Computer science education; Curriculum.

General Terms
Design, Human Factors, Languages.

Keywords
3D animation, algorithm development, game programming, objects, virtual worlds, Alice, Java, CS1.

1. INTRODUCTION
Too many students perceive the study of computer science and information technology as difficult, and computer programming in particular as too hard [4]. Those of us in the field know that learning computer programming takes thought and discipline, and has great rewards. But we also know that syntactically challenging languages like Java can discourage students in their efforts to learn how to program. The importance of CS1 in recruiting, engaging and retaining students in computer majors cannot be overstated.

Alice [2] is an object-based programming language that is syntactically light, and is easy and fun for beginners to learn. It is a freely available cross-platform interactive visual 3D animation virtual world language with a drag-and-drop integrated development editor. Being able to quickly create interesting 3D animations with Alice can be enticing, engaging, and rewarding for novice programmers [4]. Learning Alice first can make the transition to more traditional programming languages such as Java easier. The new Alice 3 release can translate directly to Java code.

Using a freely available newly published Alice workbook [3], we describe and demonstrate an interactive games approach to teaching fundamental aspects of software engineering (i.e., design, implementation, testing) and object-oriented programming concepts. The workbook material can be taught in about 2-3 weeks of classes, leaving enough time to scaffold into teaching Java.

2. FLUENCY WITH ALICE
Most Alice textbooks follow a serial pedagogical approach: methods, variables and functions, flow control, lists and arrays, events, and recursion [1]. Often, contextual material is an afterthought. The Fluency with Alice workbook has the student play the role of movie director and begins with and follows a story line. Alice features and object-oriented principles are taught as needed to move the story forward. The driving force is the story rather than Alice features. This makes algorithm design and implementation naturally engaging and even exciting. The workbook’s pedagogical approach is “tell-show-do” and is unique in that it contains over 50 Flash animations (i.e., “show”) embedded in the text itself.

In this presentation, we describe and demonstrate the workbook’s pedagogical approach. We focus on Alice proximity functions and the While control statement to program object interactions in a quest game. We show how recursive programming is easily taught right alongside of iteration as an equally viable way to implement an algorithm for object interaction and animation.

3. REFERENCES