Games to Explore Programming

Ylva Fernaeus and Jakob Tholander
Department of Computer and Systems Sciences
Stockholm University, KTH
Forum 100, 164 40 Kista, Sweden
+46 8 6747468
ylva@dsv.su.se

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INTRODUCTION
We are conducting a project where children aged 8-12 use the ToonTalk programming environment (Kahn 1996) to create their own animated computer programs. Instead of starting to explore programming at the level of codes and algorithms, our students are introduced to the programming environment via pre-built computer games that students can modify in various ways (see Tholander, Kahn et al. 2002). We are looking at design features of such games and how these can be used to engage students in creative activities with computer programming. The workings of a Pong game, for instance, might be easy to grasp, but the game itself offers few obvious ways of improvements. Changes that children tend to propose, such as adding a high-score list, are usually not feasible for them as novice users of the environment. Adventure games may invite for more modifications, but those are often of aesthetic, rather than functional kinds. Hence, an important design feature of example games is that they should include potentials for improvements, in ways that are both technically feasible as well as meaningful for the game play. Another important feature is that changes that students make should imply some exploration of the underlying programming elements.

THE VIKING GAME
We present a simple game that we have used to introduce a group of Swedish 10 year olds to the concepts of programming with ToonTalk. A total number of forty children participated, of which none had any previous experience of programming. The sessions took place in the students’ normal classroom with a researcher working with two children at a time during sessions of forty minutes.

The game (Figure 1), was designed so that the player uses the arrow keys to control a female character, and the task is to make her pass two bouncing Vikings in order to reach a food table. One of the Vikings moves significantly slower than the other. When reaching the food table, the computer makes a sound and when colliding with any of the Vikings the player is blown up in an explosion. We also explicitly included some empty space to add more objects on.

![Figure 1. The Viking game](image)

After having played with this game for a short time, most children complained that it was too easy to play and that it would become better if it could be modified a little. Most pairs initially wanted to make changes to the functionality, but there were also children who started by exchanging sounds and graphic elements of the game. The students quickly seemed to realize that each object was controlled by a number of ‘behaviours’, and that these could be moved, removed or modified in various ways. Most changes that students made required some exposure to the underlying structure of programming mechanisms. Although no ‘real’ programming took place during the session, each pair of children ended up with a fairly unique game, which indicates that the game served its purpose in inviting students to act creatively within the environment and also familiarize with some aspects of computer programming.

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REFERENCES
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