openings from 2004 to 2014 in science and engineering will be in information technology [3]. But the computer science community must do better than simply fill available jobs. Computer science promotes progress across a range of disciplines, including all the basic sciences, medicine, business, and communications. With such broad influence, it is critical for the U.S., as well as for any given national economy, that computer science attract the brightest minds. Other disciplines, including biology and chemistry, have greatly increased their talent pool in recent years by drawing from both genders. The 2005 Taulbee survey found that 84.9% of bachelor's degrees in the U.S. in computer science were awarded to men [12]. In addition to increasing the size of the talent pool, creating a more diverse computer science community will help ensure that new computing-based technologies meet the diverse needs of the global population.

Figure 1. Scene created in Storytelling Alice.

Although several factors likely contribute to the loss of student interest in computer science, one particularly important one is that students often find their first course uninspiring. Typical assignments, like "sort a list of numbers" or "generate the sum of the first 1,700 integers," fail to engage many students. There is now a growing interest among computer science departments and industry and government funding sources in using computer and video games to draw undergraduates into the field and in creating video games majors. The motivation behind these programs is a belief that today's students are likely to be much more engaged by computer games than they are by a more traditional introduction to computer science. In 2000, fewer than a dozen game-related degree programs were available in North America [8]; by 2005, there were more than 100 [8].

There is also a potential trade-off. Using games to motivate students to study computer science may help increase the number of computer science majors but further decrease the percentage of women in the field. One widely quoted 2005 survey found that the gaming population in the U.S. is 43% female [2]. This is in fact a misleading statistic because it includes casual game play (such as games like solitaire). It is likely that gaming-based majors will be more appealing to hardcore gamers than to the occasional player of solitaire and bejeweled. Who are the serious gamers? In 2006, the publisher of *Electronic Gaming Monthly* reported its readership was 92% male [11]. Netshelter, a provider of marketing information, found through a Web site survey that the community of hardcore gamers—those devoting significant capital to games-related purchases—was 97.5% male [7].

3D Movies

It is critical for preventing the further erosion of interest in the field that computer science professionals and educators find a way to motivate more female students to pursue computer science. Research into girls' educational choices has shown that to have the greatest potential effect on increasing the number of women who choose to study computer science, it is important to intercede no later than middle school, when girls typically decide whether or not to pursue math- and science-related studies [1]. Today, relatively few middle school girls learn to program computers.

If you walk into a classroom of middle school girls in the U.S. and ask how many of them want to learn to program, few hands are likely to go up. If you ask how many of them want to learn to make animated movies like those from Pixar and Dreamworks, you are likely to get a very different and very positive response. Creating an animated movie and learning to program a computer can be fundamentally the same activity.

Learning to program is recognized as a difficult endeavor. There is a long, rich history of attempts to ease the process of learning to program and make programming accessible to a broader population of people [5]. Storytelling Alice is based on an existing programming environment—Alice 2.0, www.alice.org—that allows novice programmers to create interactive 3D virtual worlds. In Alice 2.0, users construct programs by dragging and dropping code elements, thus removing the possibility of making syntax errors. Programs in Alice are animations