Kinesthetic Computer Science activities in a virtual world

Kinesthetic activities

Kinesthetic activities are analogical mediators (Banco and Traza) that enable students to experience an idea through physical activity.

Teaching in virtual worlds

A key attraction of teaching kinesthetic activities in a virtual world is that students need only be able to interact with a pointing device to “move” around the virtual environment, whereas the activities accessible to those with limited mobility may also be suitable for students who are isolated for social or personal reasons.

It removes barriers found in the real world, allowing the development of imaginative environments; the use of virtual actors from a fictional story, and the ability to create visual and verbal fictions that will engage students in the activity can also be used as representations.

A virtual world provides the opportunity to interact with others from around the world, which cannot always be found enough peers to make up a team and try the activity. We are exploring the potential of providing such activities in a virtual world; in this case, Second Life, a virtual environment in which individuals interact face-to-face through avatars in a virtual 3D space.

CS in a virtual world

A parallel sorting network was implemented in Second Life.

In the screenshot above, six individuals are about to use the sorting network in Second Life. The people interacting are in two rows, so far six rows out of order. The sorting network activity involves comparing numbers with people who are sound in the process of moving through the network marked on the ground. The students choose their path based on a simple rule, and come out the other end with their numbers sorted into order. In the process they have encountered concepts like comparison, ordering, and especially parallel processing. This activity has been used in many contexts, and is in increasing engaging for students.

However, not all students are able to participate in physically active challenges (Marghitu, et al.). in some cases they may have mobility impairment, others may have personality problems that make it difficult for them to interact with others, and others simply may not be able to find enough peers to make up a team and try the activity.

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Ideas for other activities to implement include:

• The CS Unplugged Party “magic trick”, where the parity cards can be done by playing cards on the ground instead of on a table. Students would then be asked to find a parity error check. This could also be played as a game where either racing against the clock, or against an opponent!

• Activities that involve walking around could have more elaborate guides than just markings on the pavement. For example, the “Treasure Hunt”, which uses imaginary ships and islands that students walk around, could be implemented using virtual ships taking students walking between small “islands”, or by having them follow the same “island” trails to implement the constraints required to demonstrate a finite state machine, or processes in a maze. It is limited only by imagination.

Lessons learned

Some initial experience has been gained developing and using the sorting network in Second Life. Some of the issues we have noted are:

• The main area of Second Life is restricted to people 18 and over, and there is another area for teenagers (13 to 17 years old). This makes it impossible for younger students to access the main area, and there are severe restrictions on teachers accessing the teen area. For some evaluations with students we will use a local system such as OpenSimulator.

• A group of Japanese students (average age about 25 years old) tried the system; one student was deaf, and the others had upper and lower limb mobility problems, including a visual impairment. Some had difficulties learning Second Life (and noted the difficulty of having to put on a实在skin suit), but most adapted to it quickly and would like to have spent more time there. One noted that it worked a lot better on a more powerful computer, and another noted that the primary language of the environment was English, which some of the students had difficulties understanding.

• Most of the students enjoyed the experience and would like to use it more. Although one student preferred the “real world” and found the virtual environment “lonely”, others enjoyed the interaction in the virtual environment, and one preferred interactions in SL to the real world. One appreciated that it used less space. Another found that they preferred the SL environment “far and away” compared with the physical world, although also noted that while the environment was fun, personal interactions in the real world are more meaningful. The deaf student enjoyed using the text chat.

• For completely new members of Second Life, there would have been benefit in having some very basic exercises to build confidence in simple matters like talking to each other, and moving around, before engaging in a challenging Computer Science based activity. On the other hand, it may turn out that such activities provide a good medium for developing this confidence. In the initial design, participants acquired a Second Life avatar, and could use it on their own devices. But we have found that participants in our group have limited access to virtual worlds skills not directly related to doing the activity. In future versions we would use a simpler approach, such as wearing a vest or hat.

• Because participants are in different locations in the real world, it is possible that they have local distractions such as visitors, phone calls, or online. This is not too unlike a real-world situation, where members of a class may become distracted talking to each other! However, it can mean that people miss important instructions, and it may be not so obvious that they were distracted.

• Because our group spans 4 countries, it was impossible to find a time that all members could meet during reasonable hours. Although most parts of countries could find convenient meeting times, international meetings may be difficult given that school students would be constrained by class times in addition to limited windows of common working times.

References

Contact

Unplugged? In a virtual world?!

“Unplugged Activities” for Virtual World may seem to be the antithesis of what the offline “Unplugged” project is about. In fact, simple simulations and virtual activities are a virtual world is a form of reality that works better for them, and for some it can offer the ability to participate in activities that simply aren’t possible in a physical environment.