

Formal and informal learning in a computer clubhouse environment

Introduction

This paper outlines the establishment and running of an after-school Computer Clubhouse, describing aspects of the leadership, mentoring and learning activities undertaken there. Research data has been collected from examination of documents associated with the Clubhouse, interviews with its founders, Director, session leaders and mentors, and extended observations of the activities in Clubhouse sessions. The paper will use vignettes, descriptions of a large-scale "haunted house" project and of a student peer-tutoring activity, to illustrate some of the innovative teaching approaches and formal and informal learning outcomes observed in the Clubhouse environment.

The Computer Clubhouse

The Computer Clubhouse at the Fitzroy Learning Network in Melbourne is part of a worldwide network of Computer Clubhouses initiated in 1993 by the Museum of Science in Boston as a result of learning research conducted at the Massachusetts Institute of Technology's Media Laboratory. For a Clubhouse to be part of the international network, and therefore be sponsored by it, it is required to be open for a minimum of 20 hours per week. The Fitzroy Clubhouse operates after school most weekdays, as well as running programmes during the school holidays.

The Clubhouse operates within a local community Learning Centre. The purpose of the Clubhouse is to offer children from underserved communities, opportunities that they would otherwise not have, particularly to work with computers in a safe, relaxed and supportive after-school learning environment with the help of adult mentors. Its approach is based on research that shows the importance of interpersonal relationships and community in the learning process, acknowledging that the people around them, peers as well as adults, can influence young people a great deal outside school hours.

The educational approach of the Clubhouse is articulated in four principles. It focuses on "constructionist" activities (Harel & Papert, 1991; Kafai & Resnick, 1996), encouraging young people to work as designers, inventors and creators. It encourages its members to work on projects relating to their own interests. It aims to create a sense of

community, where young people work together with one another with support and inspiration from adult mentors. And it is dedicated to offering resources and opportunities to those who would not otherwise have access to them.

Clubhouse participants are deliberately encouraged to become designers and creators - not just passive consumers - of technology. Rather than simply playing computer games or learning to use computer applications, the students learn how to use professional software for design, exploration and experimentation. They can try for themselves the experience of being an architect, engineer, composer, artist, journalist, scientific researcher, computer programmer, or any of a wide array of other professions in the modern workplace. Facilities available to Clubhouse members include high-end computers, digital cameras, video cameras and Lego robotics kits. Resources, materials and tools are provided for the design and building of computer simulations, multimedia creations, animations and videos, electronic music, computer programs and games, electronic publishing, computer-controlled devices, three-dimensional designs, and World-Wide Web pages.

The Clubhouse members range in age from 8 to 18 years, with a fairly equal mix of boys and girls, with a diversity of cultures including Hmong, Afghani, Pakistani, Ethiopian, Vietnamese, Chinese, Koori and 'Anglo' Australians. In term time different groups attend on particular weekdays; for example Mondays are for "older kids", Tuesday is Girls' Night, Wednesday is Boys' Night and Thursday has an after-school care session followed by another older kids' time.

Activities in the Computer Clubhouse

The Clubhouse fosters a learner-centred educational approach that encourages participants to discover and develop their interests. Activities in the Computer Clubhouse are guided by current

ANNE McDOUGALL

JENNY LOWE

JOSIE HOPKINS

Department of Science
and Mathematics
Education

The University of
Melbourne

Vignette: The Haunted House Project

To illustrate some of the activities and learning outcomes occurring in the Clubhouse environment we shall describe here the "Haunted House" project, a substantial team project undertaken in weekly sessions on Girls' Nights at the Clubhouse over a period of several months. Some ten to fifteen girls, all of elementary school age, attended the Clubhouse regularly on Tuesdays during the time in which this project was observed. All the girls were from the local Hmong community, all knew each other, and most attended one or other of two local schools.

The haunted house theme was suggested in a brainstorming meeting, and lists of useful ideas and resources were made on the meeting room whiteboard. At subsequent meetings the girls developed and refined the ideas for the project and devised two storylines; the first centred on the members of a rock band who become lost in a forest but find the house and decide to rehearse there, and the second concerned a woodchopper and the discovery of skeletons in the basement of the house. Subsequent sessions saw the project developed by various and changing sub-groupings of the girls, utilising the technological and other resources in the Clubhouse and the skills of all of the mentors.

Internet searching was an early and ongoing activity for the project. Lists of potentially useful images ("scary" things including witches, vampires, bats, vultures, spiders, monsters, and so on) and sounds (including howling wind, footsteps, groans, snorts and creaks) were developed in whole-group brainstorming sessions. Then groups of two or three students – including, for example, a scary pictures group, a scary noises group, a woodchopper story group – would search on the Internet and collect materials they considered useful into labelled folders which the students then saved so they would be available subsequently to all the students via the network. One group searched for a picture of a building that might be suitable for the haunted house. Another looked for "scary fonts" that might be used for the written parts of the project. The woodchopper story group searched on words such as "crypt" and "cemetery", with help from a mentor to get the spelling correct.

Digital photography provided another source of images for the project. On several occasions groups of three or four students, accompanied by a mentor, took the camera outside at dusk, photographing a local cat, parts of old buildings and fences, and a staircase to which they planned to add later some "ghosts and vampires". The members of the rock band made costumes from tissue, pipe cleaners, and other materials, and posed for photo-shoots in various nearby outdoor locations.

When no graphic deemed suitable for the haunted

house could be found on the Internet, a group took photographs of the Fitzroy Town Hall, an old stone building close to the Clubhouse, for later modification to serve the purpose. Returning to the Clubhouse and a computer, they selected and cropped an appropriate shot, and then printed it on a large sheet of paper so that one student with definite ideas about the design of the haunted house could show with pencils the modifications she thought necessary. After some discussion, and further modification by others in the group, the final design was developed on the computer with the help of one of the mentors with expertise in PhotoShop, Illustrator and Flash software. The newly drawn roof was filled in to match the original Town Hall, and a greenish, blotchy graphic, found on the Web, was selected to fill the background representing the night sky. PhotoShop was used to alter the darkness of the original photograph, then the students decided to remove the colours altogether to make a picture of black and shades of grey.

The final design retained the rows of windows in the original Town Hall picture, and the students planned that each window would represent a room, to be entered using buttons which would reveal scary pictures and sounds, music and pictures of the rock band, and, in the basement, images relating to the woodchopper story. They saved the final version of the haunted house design onto the network so that other groups of students could work on the individual windows on their computers.

Informal learning of constructionist teaching

Watching the activities of the Computer Clubhouse participants on one occasion, one of the authors noticed that two of the students were standing, each one behind two other students working individually at computers; they were watching the students working and apparently acting as "mentors". The researcher gathered from the teacher that she had suggested some peer tutoring, rather than ask the students to use software at the Clubhouse different from that being used at their regular school - the regular mentors all knew the DreamWeaver software but some of the students had learned Front Page at school. In itself this would not be surprising; students often help each other with programming tricks or show each other things that they have made (McDougall & Boyle, 2004). But as the researcher watched and listened, what she saw here

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was remarkably different from the usual student demonstrations or explanations.

Typically a student will take over the keyboard to show a programming trick, or demonstrate using his or her own project. By contrast, these students – we shall call them student “mentors” – watched, asked leading questions, and always seemed ready to withdraw and let the students proceed on their own. They would ask questions like, “OK, do you think you can do it now?” and “Did that work OK? Are you right now, or do you need some other help?” When the students were ready to proceed independently the “mentor” would move to another computer to work with someone else. Like their regular mentors, the student “mentors” were providing brief demonstrations or explanations of new skills and programming strategies, then immediately handing control of the work back to the student, watching or checking that the student could continue alone; they facilitated and supported learning but did nothing that would take any ownership or initiative away from the students they were helping.

We should of course not be surprised to see students imitating the actions and strategies of their teachers when they, the students, are put into “teaching” roles. However as a pre-service teacher educator, the researcher could not but be impressed at the ease and naturalness with which this particularly mature teaching behaviour had been developed by the student “mentors”, who, it must be remembered, were Grade 6 students at their regular elementary school. Teaching with IT has not previously been an area where trainee teachers can draw on extensive experience of watching their own teachers during their school years, unlike in Mathematics, say, where a teacher in training will have perhaps twelve or thirteen years of subconscious critical observation at the receiving end of Mathematics teaching. Many specialist IT teachers have only their university lectures as an example of how IT skills may be taught. We are confident that in the constructionist approach to learning and teaching we have been observing in the Clubhouse, and in the spontaneous modeling of this approach by student peer helpers, there are valuable lessons to be learned about IT teaching and teacher education.

Conclusion

The Computer Clubhouse with its deliberate establishment of a project-oriented constructionist learning environment and its use of highly skilled mentors as just-in-time learning resource people, provides for its student members a technology-supported learning environment which is rich in opportunities for both formal and informal learning. From our observation of the Haunted House project it is clear that many areas of the elementary school curriculum are being addressed, sometimes incidentally but always with purpose, as well as an extensive range of technological competencies and many teamwork and problem solving skills. The informal learning of a quite sophisticated form of teaching described above is just one example of a range of interpersonal, collaborative and group working skills also being supported in this technology rich setting.

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