

Teacher Scaffolding: An Exploration of Exemplary Practice

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Abstract While computers have increasingly been used in classroom over the last twenty years, their application has often been mundane; being merely used to reinforce existing educational practices rather than as a catalyst for educational innovation. An effective way to bring about change may be to identify instances of best practice and then study associated strategies that may be useful for teachers trying to use computers in new and meaningful ways. This study investigates strategies used by a teacher deemed to be exemplary at using computers and associated technology in her classroom. It involved observing and recording teaching sessions conducted by the teacher. This paper discusses the learning task, the children's progression through the task and the teaching strategies used. In particular, it looks for instances of teacher scaffolding as a strategy for supporting children working with computers.

1. BACKGROUND

One of the most significant directions evident in education in recent times has been the restructuring of education catalysed by technological innovation. An integral and core part of the restructuring process is a change to instructional practices. New models for teaching and learning incorporate a focus on problem-solving, collaborative learning, real purpose tasks and transformed teacher roles (e.g. Jonassen 1996). As teachers are expected to adopt new models, they also need to reassess their approach towards educational processes and the integration of technology tools (Bork 2000). It

seemed that the advent of technology-based school reform demanded new attitudes from teachers, different strategies and even that teachers adopt a new teaching paradigm.

Even though policy was requiring a new approach to teaching with computers, research indicated that resistance to change was still an impediment. While transformation in practice was demanded, it seems that teachers were finding it difficult to make the adjustments required. Sandholtz, Ringstaff and Dwyer (1997) suggested that rather than blame teachers for their reluctance to use technology in new ways, the problem should be considered from the teachers' perspectives. Teachers have a responsibility to foster learning for their students and they need to be reassured that using computers in constructive ways will promote positive learning outcomes. Research from the Apple Classroom of Tomorrow (ACOT) project (Sandholtz et al. 1997) found that although teachers initially relied on traditional teaching strategies when using computers, over time, with supportive teacher development, they did adapt to more constructivist approaches.

Campoy (1993) suggested that the use of computers and especially software that promotes constructivist learning might actually be a catalyst to encouraging teachers to teach in more constructivist ways. This was supported by Hannafin and Savenye (1993) who felt that the show-casing of success stories of teachers using computers in meaningful ways would encourage others to try new methods. Additionally, in a report on the use of technology (President's Committee of Advisors on Science and Technology 1997) it was identified that teachers need to be provided with pedagogical support, including opportunities to observe within the classrooms of successful technology-using teachers.

A major component in the attempt to bring about effective computer use in schools is the type of activity that teachers are initiating in their classrooms. Research over the last twenty years has shown that using computers for traditional educational tasks, in traditional teaching styles has not significantly changed educational outcomes (Jones, Valdez and Nowakowski 1995). Instead, effective computer implementation is hinged on new learning tasks that promote "engaged, meaningful learning and collaboration involving challenging and real-life tasks, with technology as a tool for learning, communication and collaboration" (p. 1). Therefore, when examining teaching practices, we must also be cognisant of the type of activity that the children are engaged with. In particular we need to seek 'rich tasks', i.e. tasks that are designed to engage children with "knowledge, fields and paradigms that have power and salience in researching, analysing and interpreting the world" (Education Queensland 2000).

In previous research (Yelland and Masters 1999) we have identified that teacher scaffolding is a key aspect of effective computer use by children. The term 'scaffolding' was first described by Wood, Bruner and Ross (1976), who defined it as "a process that enables a child or novice to solve a problem, carry out a task or achieve a goal which would be beyond his unassisted efforts (p. 90)". The concept arose out of a consideration of Vygotsky's theories in which he hypothesised that guided interactions with an adult or a more capable peer could assist children to develop at a higher level of operation. Vygotsky suggested that this support allowed a child to extend through the Zone of Proximal Development. Consequently, when scaffolding is provided, a child may not only accomplish the task at a higher level but also internalise the thinking, strategy or mechanisms used to be able to approach similar tasks. (Rogoff 1990).

Research has shown that although the nature of the scaffolding is dynamic and must be modified according to the task and the learner, several key characteristics of scaffolding can be identified (Beeds, Hawkins and Roller 1991). First, the interaction must be collaborative, with the learner's own intentions being the aim of the process (Searle 1984). Second, the scaffolding must operate within the learner's zone of proximal development. Rather than simply ensuring the task is completed, the scaffolder must access the learner's level of comprehension and then work at a slightly beyond that level, drawing the learning into new areas of exploration (Rogoff 1990). The third characteristic of scaffolding is that the scaffold is gradually withdrawn, as the learner becomes more competent. Palincsar (1986) suggests that this notion re-inforces the metaphor of a scaffold as used when constructing buildings in that the means of support is both adjustable and temporary.

In our own research (Yelland and Masters 1999) we have identified that scaffolding with computers can also be classified into categories. In addition to *cognitive* scaffolding where a teacher can support children when constructing understanding, we also found that scaffolding may be *affective*, with the teacher supporting the children emotionally, and *strategic*, in which the teacher can provide task management support. A final category that is especially pertinent to using computers and associated technology is *technical* scaffolding. In this situation the teacher facilitates the operation of both the hardware and the software, in order for the students to focus on the learning aspects involved.

2. THE SETTING

The classroom chosen for this investigation was somewhat special. The research school was designed to be a state-of-the-art technology institution and was purpose built with facilities to support the integration of information and communication technologies in the classrooms. The infrastructure of the school incorporated at least four networked multimedia computers in each classroom with ceiling wiring to enable them to be situated in central hubs. Each double classroom also had a large screen monitor on a movable trolley that could be connected to any of the computers. Additionally, the students had access to peripherals such as still and movie digital cameras and scanners. A full time technology co-ordinator supports classroom teachers at the school.

Woodcrest College opened in 1998 as a primary campus and in 2000 extended its scope to incorporate a P-12 curriculum over a lead-in period, which will reach capacity in 2004. Another feature of the school is the Teacher Development Centre, which provides professional development for teachers in effectively using technology in classroom teaching practice. The centre runs a program in which teachers from other schools can visit to observe the teachers using technology with students and to participate in discussions about staff development, and school change. The stated learning outcomes of the project are that participants are presented opportunities to develop an understanding of:

- Constructivist classroom practice
- The role of educational technology in supporting effective learning and teaching
- Strategies to integrate educational technology into classroom practice
- A range of applications of educational technology to support a student centred constructivist approach to learning and teaching.

The class we observed in this study was a double year two/three group, with 52 children aged between 6 and 9 years. The group occupied two large adjoining rooms, separated by a sliding panel that could be closed or opened as required. The setting had been arranged so one room served as an activity area with very little furniture, while the other was used for seated activities, with tables for groups of children. There were eight computers located in pairs across both rooms, with four moveable workstations in the activity area to allow for maximum adaptability.

There were two teachers with the class who had both been teaching at the school since it was opened (3 years). One teacher, Angela was a graduate when appointed, while the other, Gillian, had previous teaching experience and was completing a Masters degree specialising in computers in education. Both teachers were recognised as having expertise with integrating

computers into classroom activity and both regularly hosted visitors from the teacher development program.

3. THE ACTIVITY

The class had been investigating 'mini-beasts'. This topic had been integrated across the curriculum and the children had been examining the lifestyle and habits of various mini animals such as insects, arachnids and small reptiles, e.g. geckos. The culminating activity for the theme was for the children to work in groups of five or six and use the computer to produce a modelling clay animation (a quick-time movie) depicting a sequence in the life of a chosen mini-beast. In the animation they needed to illustrate the mini-beast's home, the food source and its mechanism for movement. In order to conceptualise their animation, the children had examined a 'Wallace and Grommit' movie, a popular children's series that uses a modelling clay technique to produce animation.

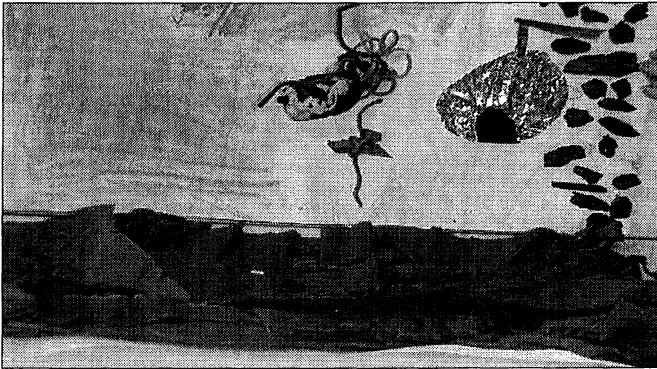


Figure 1. Bee set with bee, hive and flower

The activity was broken down into a number of tasks:

- Decide on the mini-beast and define the home, food and movement for that beast.
- Use a storyboard to plan the sequence. The sequence should include at least six stages.
- Design and produce the props. Produce a mini-beast using modelling clay and develop the set for the movie. This will include a backdrop, a foreground and any objects on the set.
- Film the sequence. Assemble the set and set up the digital camera on a tripod. Take a series of still shots of the mini-beast on the set in order to develop the animation.

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