ARE THEY USING THE TOOL TO LEARN, OR STILL LEARNING TO USE THE TOOL? –AN OBSERVATION OF MIDDLE CHILDHOOD STUDENTS DOING RESEARCH ON THE COMPUTER

Karen S. Robinson, Ph.D.
Patti R. Albaugh, Ph.D.

What happens when students are using computers to do research? This paper describes a study conducted in 18 middle-level classrooms (grades 3-8) while students used computers for research activities. Classrooms were located in suburban, urban, and rural schools. Data were collected during observations of classroom work with computers. The following questions were asked: *How is the working environment arranged? What tasks are students doing? What is the nature of the language being exchanged between teacher and students?*

HOW IS THE WORKING ENVIRONMENT ARRANGED?

Out of the 18 classes observed, 8 were in dedicated computer labs; 3 were in library/media areas; and the remaining 7 were in classrooms. In the labs, the typical arrangement was15-30 computers located along the perimeter of a rectangular room; in two of the labs, computers were arranged along the perimeter as well as along the center of the lab. Most students worked at their own computers, with the occasional pair of students sharing. In the 3 library/media areas, some students worked at computers, while others were working with print sources in the library. In the classrooms, there was a range from 2 to 5 computers (mean = 3.4); in all but one situation, the computers were together, along a wall or protruding from a wall on a table. (One of these teachers also had 10 Alphasmarts in her classroom.). In all but one case in the classrooms, a computer was shared by more than one student (up to 4 students at one computer). In all the classrooms, more than one activity was going on at once, and the teacher was busily managing it all.

WHAT KINDS OF RESEARCH ACTIVITIES ARE STUDENTS DOING?

We stipulated to the teachers that we wished to watch students using the Internet or using CD's and "doing research." We found that teachers define research in many different ways. Students' research activities varied widely and included Internet treasure hunts, online tutorials, structured research projects, and open inquiry. We categorized the 18 activities into 3 task categories. These are listed below, with an example from our observations.

Otterbein College
Westerville, Ohio

Table 1. Task Categories for Students' Research Activities

Task	Description	Example Observed
Scripted Task	Students followed procedure from a worksheet, workbook, or on-screen tutorial; they were assigned a website address or location on a CD. Some kind of "restricted response" was required, such as a fill-in-the-blank or matching item.	Website address was listed at top of worksheet, with names of eminent paleontologists. Seventh graders matched the names with phrases describing the person's contributions.
Combination Teacher Structure/ Student Choice	Teacher prescribed a procedure for finding information. Students made decisions regarding topics to pursue, sources to check, or details to be retrieved. Teacher prescribed method of presenting information learned. Students made decisions about the composition of that information.	Fifth grade students were assigned various sub-topics of "Human Organ Systems." Working in groups, they gathered information from print and computer sources and created a PowerPoint presentation of the information.
Informal Exploration	Teacher gave no procedure for research. Students explored on their own, seeking sources and deciding how to retrieve the information gleaned. Teacher worked as a partner with the children, intermittently responding and facilitating.	An after-school group of fourth graders was organizing for a Destination Imagination project (like Olympics of the Mind). They explored different search engines, looking for background information for an "egg drop" project.

Of the eighteen observations, six involved scripted tasks; eleven were combination teacher structure/student choice, and one was an informal exploration.

WHAT IS THE NATURE OF THE LANGUAGE BEING EXCHANGED BETWEEN TEACHER AND STUDENTS?

While students were working at the computers, we focused on one computer and the user(s) at that computer (target students). We wrote what we saw the target students doing and what we heard them say or what was said to them. One of our major interests was the teacher's language: What would the teachers be saying? Would they be questioning, probing, or giving directions? In most cases, the teacher was moving around the room, addressing the entire group or facilitating individuals as they worked. In general, during a students' time at the computer, there were very few statements directly aimed at the students from the teacher. We analyzed the language statements by sorting into categories, freely adapting those from the work of Oliver and McLoughlin (1996).

The predominant form of language directed at the target students from the teacher (> 90%) was procedural: the teacher made a suggestion or asked a question that involved classroom management or technical assistance. Other categories of language were instructional and cognitive.

Table 2. Categories of Language Used by Teachers to Students

Language	Definition	Examples from observations
Procedural managerial	Stating a simple command or direction: questioning or suggesting a next step pertaining to work behavior	"Who's reading to you? Remember, we discussed that one reads, one writes."
Procedural technical	Stating a simple command or direction: questioning or suggesting a next (technical) step pertaining to the computer equipment or search procedure	"It looks like this site has lost some info, so I'm not sure you're going to be able to answer the question here. Let's go to #3. I'll call out loud the URL."
Instruc-tional	Explaining or questioning about the content being studied	"That's William the Conqueror, not William Wallace."
Cognitive	Urging student to delve deeper into content or search or suggesting alternate inquiry procedure	"What kind of graph do you want? What kind of graph do you need?"

Rarely did students initiate interactions with the teacher during their work at the computers. When help was needed, they often asked nearby friends. When the teacher came close to their area of the room, student-initiated interactions were usually questions about technical procedures (e.g., "How do I print?").

DISCUSSION

Our data have led us to more questions: We ask, "How much research are children learning to do, where they are actually posing questions, strategizing about and locating good resources, and synthesizing their findings? And where does the computer fit into that process?" We did not observe the students and teachers prior to or after the computer use; consequently, we wonder, "Is there more instructional or cognitive discourse (and less procedural) when computers are not being used?" More germane to our work in pre-service are these questions: "Can we arm new teachers with the necessary managerial and technical skills, so that they can give more emphasis to facilitating students' research and inquiry? And can we convince them of its importance?"

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