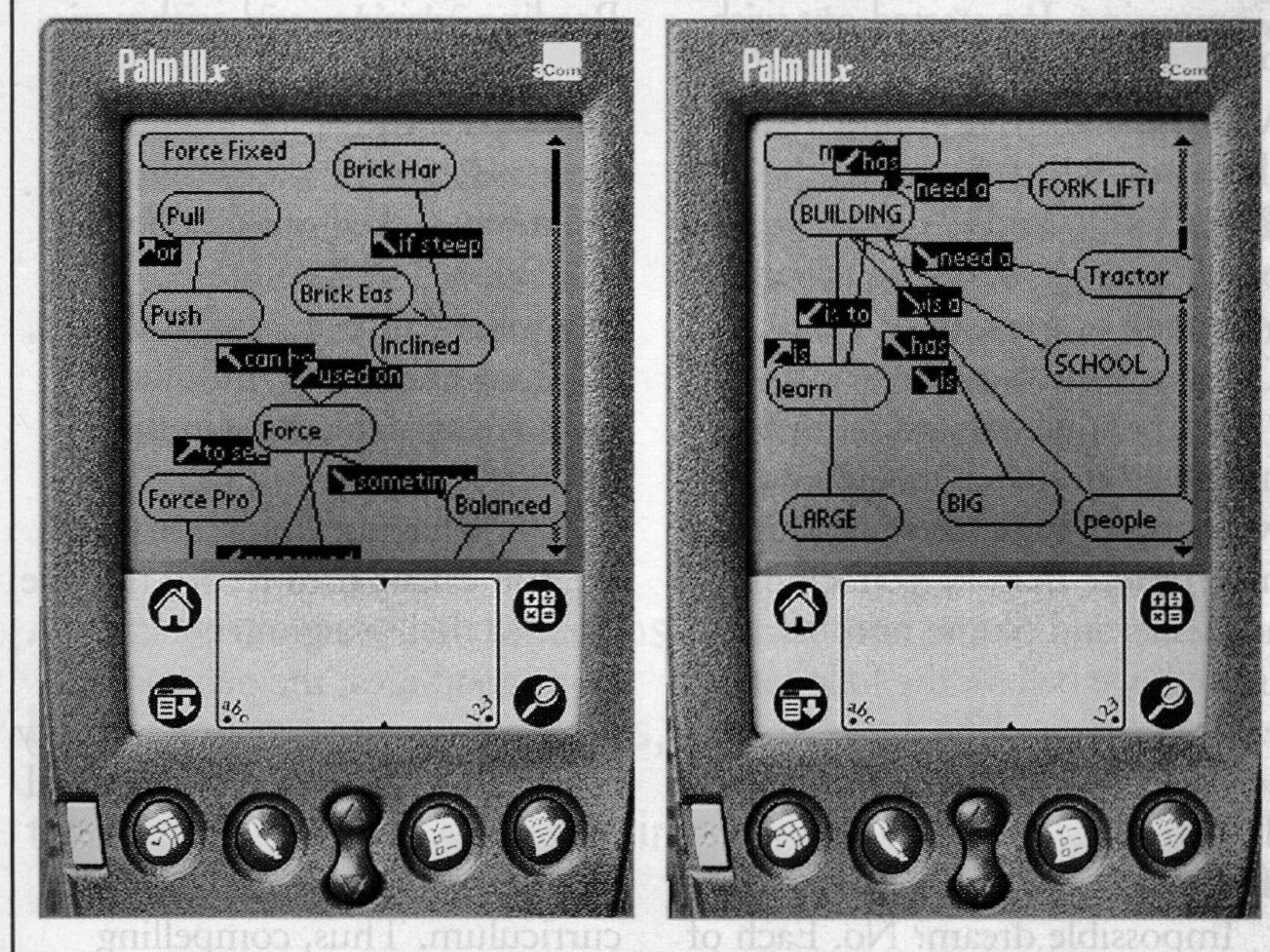


Log On Education

Figure 1. Examples of PicoMaps created by students.



that enable learning and teaching.

And (here is the really important bit) link those applications to existing curricular materials so educators essentially already know how to use the handheld devices. Having enough applications that have educational utility is strong ammunition in arguing for a switch from graphing calculators, a definite one-trick pony, to handheld devices. Here then, are our candidates for some effective handheld applications.

PicoMap. PicoMap is a concept mapping tool for handheld devices. Figure 1 presents several PicoMaps created by 10- to 12-year-olds in Detroit during a unit on the physics of heavy machinery. PicoMap goes beyond paper-and-pencil concept maps in the

following ways:

- First, children beam their PicoMaps to each other. For example, children will pair up and, in a group brainstorming activity about, say, water quality, one child will identify sources of chemical pollution (nitrates) in their local river while the other child will identify sources of physical pollution (sewage). Then the children beam each other their ideas to support the ensuing discussion.
- Since each child has a handheld device ready-at-hand, children naturally revise their PicoMaps. In contrast, if their documents are on a desktop computer accessed only one hour per week, children will not engage in

the critically important process of iterating and revising their documents.

Children can print out their PicoMaps, allowing the teacher to track what the children are doing and give feedback, while parents use the printouts for refrigerator decorations. Classroom management issues are not to be taken lightly; making printing straightforward makes teachers comfortable with having each of their 30 students equipped with a handheld device. (If only syncing 30 handheld devices to one desktop computer was as simple.)

Palm sheets. For better or worse, worksheets are a fixture in K-12 classrooms. But a handheld device's worksheet has numerous advantages over its paper cousin: the handheld device can immediately check a student's input and provide feedback. After the data from the worksheet are transferred to a desktop computer, the data can be automatically aggregated and graphs presented that depict all the students' answers. Figure 2 shows an 11-year-old filling out an Air Quality Inventory worksheet.

Cooties. How do germs spread? Drawing on the work at the MIT Media Lab with SmartBadges, we developed a socio-kinesthetic simulation on handheld devices to help children understand this process. Children "meet" each other by walking around a classroom with a handheld device and beaming each other either a digi-