

## Using Handhelds to Promote Creative Thinking Skills

To be skilled creative thinkers, students must be trained in the techniques and methods used by creative people to create creative things. Creativity is about the creative person, the creative product, the creative process, and the creative press, or environment (Davis, G. A., 1999). Creativity takes sustained effort (Scardamalia, M. & Bereiter, C., 2003).

The importance of creative thinking skills is addressed in NETS Standard 3 (ISTE, 1998):

### **3. Technology productivity tools**

- *Students use technology tools to enhance learning, increase productivity, and promote creativity.*
- *Students use productivity tools to collaborate in constructing technology-enhanced models, preparing publications, and producing other creative works.*

In addition, by the time students have completed 12<sup>th</sup> grade, they should be able to meet the following standard:

- 10.** *Collaborate with peers, experts, and others to contribute to a content related knowledge base by using technology to compile, synthesize, produce, and disseminate information, models, and other creative works.*

The emphasis in these standards is for students not just to be able to develop creative works, but that they should be able to work collaboratively with others and to be able to share the results of their efforts. Handheld computers, or handhelds, offer students an easily accessible way to accomplish these goals. They are small, inexpensive and simple to use (SEIR\*TEC, 2002).

### **Creative Writing**

One obvious activity that students can complete with handhelds is creative writing. Handhelds that use the Palm OS come with two applications that can be used for this activity. The first one is 'Memos' as illustrated in Figure 1. 'Memos' is a simple word processing application that provides students with room for about 3 screens of text.

Students can use a variety of methods to input text into a handheld. The most direct way is to use the stylus to make Graffiti 2 characters on the screen. Graffiti 2 is a simple, but specific form of writing that can be understood by the handheld. Also available is an onscreen keyboard. Another alternative is to use a wireless keyboard that communicates with the handheld using infrared signals. The second built-in application is 'Notepad.' With 'Notepad' students can simply write directly on the screen. Each note can contain about 2 ½ pages of information.



**Figure 1 - Memos Application**

Many handhelds being offered today also come with 'Documents-to-Go' developed by Dataviz. 'Documents-to-Go' allows a student to use the popular Microsoft software applications of Word, Excel and Powerpoint. Word is a word-processing package, Excel is used for spreadsheets and Powerpoint is used for presentations. With the handheld version of Word, students have tools to format text and paragraphs, use tables, or to add hyperlinks.

If students are in an environment where they can use their handhelds on a daily basis, the handheld becomes an excellent tool for keeping journals and idea lists. Idea lists are a technique that can be used by anyone (Adams, 2001). They encourage students to formalize an idea by writing it down and it ensures that the idea is not lost.

Creative writing is only the beginning of how students can gain skills in creative thinking by using a handheld. Many teachers are actively seeking ways to encourage learners to construct and produce knowledge. Some of "generative" instructional strategies promoted by members of the Northwest Educational Technology Consortium (NETC) (Jones, Valdez, Nowakowski, & Rasmussen, n.d.), are ideal starting points for building creativity skills in students. The list of generative instructional strategies includes:

- Brainstorming and categorizing
- Techniques for constructing mental models and graphic representations

- Co-construction of knowledge
- General and content specific problem-solving processes
- Mechanisms for exploring multiple and differing perspectives
- Techniques for building upon prior knowledge

In this article, the first three techniques will be discussed. The last three techniques will be discussed in a future article.

### **Brainstorming and categorizing**

Brainstorming is the most common technique used to generate ideas. In a classroom setting, brainstorming techniques can be used and taught to students anytime there is a need for students to generate ideas, to generate a list of possible problems, or to generate a list of potential solutions. There are several variations to the classical brainstorming with which most people are familiar (Branham & Tiritoglu, 1997). Some of these variations can be facilitated using handhelds. Information about other creativity techniques can also be found on the Internet (Mycoted, n.d.).

### **Ideawriting**

In Ideawriting, students are given a topic about which to generate ideas. Using 'Memos', students create a new memo and then write down an idea. When everybody has completed a memo, students "beam" their memos to the student next to them. The process of beaming is built into handhelds and allows users to transfer files to each other using infrared signals. With the beamed memo, the student reads the previous idea and expands on it, or adds a new idea to the list. The process is continued until all students have had the opportunity to add to or expand every other student's original idea.

### **Snowballing**

Snowballing is a technique where ideas are generated, presented and then grouped together. Using this technique, students would create a new category within the 'Memos' application. Each idea the student has would be entered on a new memo. When all the ideas have been generated, all the students would beam their ideas to the instructor or other designated person. The instructor would then connect their handheld to an LCD

projector using a device like Margi's Presenter-to-Go solution. The list of memos and ideas could be presented to the students and the class could then work together to further categorize the ideas into groups.

### **Gallery Method**

The first step is to present a problem statement to the group. Adopting this method for use with handhelds, students would use 'Memos' or 'Notepad' to document their ideas. After a period of silent writing, all the ideas would be beamed to the other students. Students would then examine the ideas, and a second round of silent writing would be conducted. Upon completion, the ideas would be further examined to select those ideas worth pursuing.

### **Techniques for constructing mental models and graphic representations**

Visualization is a powerful tool that can be used by students to creatively explore new concepts and ideas. David Hyerle (1996) has promoted the educational use of visual tools in three different contexts: to document brainstorming webs, to organize tasks, and to show relationships between objects. The use of advanced organizers, concept maps, and mind maps has become very common and can be used in all subject areas including math (Brinkmann, 2003) and science (Owen, 2002).



**Figure 2 - Graphics Application**

One of the most popular software packages being used in schools today is Inspiration developed by Inspiration Software, Inc. A version of Inspiration is now available for the handheld. Another popular commercial software package is PiCoMap available as part of the Handheld Learning Environment (HLE) offered by GoKnow, Inc. There are even free applications, such as Idea Pad, that can be used for simple concept maps.

There are several good applications for drawing as well as animation. Links to some of the available free software in this area are included in the Resources section of this article.

## **Co-construction of knowledge**

The ease with which students can transfer files to each through beaming positively impacts their ability to collaborate on projects. Students can even work together to make their own eBook. With free software called 'BookShare', students can create books, chapters, and enter their text. A special utility that comes with the software called 'BeamSync' will automatically integrate changes from two books when they are synchronized.

For more elaborate projects, teachers can invest in Palm's eReader Pro. With this software, students can create books that include images and hyperlinks. The completed books are then saved to a special format that can be read with the free Palm eReader software.

Handheld computers are still evolving. As they become more sophisticated and more powerful, they will become even more useful as teaching tools. Research has shown that when interventions on creativity are paired with technology they can have a positive impact on the personal creativity of students (Proctor, 2001). Handheld computers offer students a means to learn *with* technology rather than just learn *from* technology or learn *about* technology (Boethel, M. & Dimock, K. V., 1999).

In this article, the topics of brainstorming and categorizing, techniques for constructing mental models and graphic representations, and the co-construction of knowledge were covered. In a future article, these additional techniques will be discussed:

- General and content specific problem-solving processes
- Mechanisms for exploring multiple and differing perspectives
- Techniques for building upon prior knowledge

**About the Author – Linda Merillat**

Ms. Merillat is currently a doctoral candidate at the University of Kansas (KU), Lawrence, KS and is pursuing a Ph.D. in Education with an emphasis in Educational Technology and Interaction Design. After receiving her undergraduate degree in Computer Science, Ms. Merillat has worked with dozens of organizations on the design and development of computer applications. She is currently employed with Advanced Learning Technologies in Education Consortium (ALTEC) at KU where she provides project management and leads the development on several web-based initiatives for teachers and educators. She is a PalmOne Education Training Coordinator (PETC) and actively works with private and independent schools in Missouri on integrating handhelds into their classrooms.

## Online resources

<b>Vendor</b>	<b>Resource</b>
<b>Applied Thought</b>	<b>BookShare</b> <a href="http://palmgear.com/index.cfm?fuseaction=software.showssoftware&amp;prodid=27456">http://palmgear.com/index.cfm?fuseaction=software.showssoftware&amp;prodid=27456</a>
<b>Dataviz</b>	<b>Documents-to-Go</b> <a href="http://www.dataviz.com/">http://www.dataviz.com/</a>
<b>Freeware</b>	<b>Idea Pad</b> <a href="http://www.freewarepalm.com/graphics/ideapad.shtml">http://www.freewarepalm.com/graphics/ideapad.shtml</a>  <b>Sketcher</b> <a href="http://www.freewarepalm.com/utilities/sketcher.shtml">http://www.freewarepalm.com/utilities/sketcher.shtml</a>  <b>Animate and Draw</b> <a href="http://www.freewarepalm.com/graphics/animateanddraw.shtml">http://www.freewarepalm.com/graphics/animateanddraw.shtml</a>  <b>Animator 1.5</b> <a href="http://www.freewarepalm.com/graphics/animator.shtml">http://www.freewarepalm.com/graphics/animator.shtml</a>
<b>GoKnow</b>	<b>Handheld Learning Environment (HLE)</b> <a href="http://www.goknow.com">http://www.goknow.com</a>
<b>Margi</b>	<b>Presenter-to-go</b> <a href="http://www.margi.com/">http://www.margi.com/</a>
<b>Microsoft</b>	<b>Microsoft Office (Word, Excel, Powerpoint)</b> <a href="http://www.microsoft.com">http://www.microsoft.com</a>
<b>Palm</b>	<b>eReader Pro and eBooks</b> <a href="http://ebooks.palmone.com/">http://ebooks.palmone.com/</a>  <b>Handheld computers</b> <a href="http://www.palmone.com/us/">http://www.palmone.com/us/</a>  <b>Palm OS</b> <a href="http://www.palmsource.com/">http://www.palmsource.com/</a>