



www.palmgrants.sri.com

Palm Education Pioneers Program Round I Preliminary Evaluation Report

Prepared by

Valerie Crawford and Phil Vahey
SRI International

October 2001

(c) 2001 Palm, Inc. All rights reserved.

This research was conducted under a contract from Palm, Inc.
Neither SRI International, its officers or employees, nor any person acting on behalf of any of them make any representations with respect to the use of the information contained in SRI's report.



Introduction

SRI International's Center for Technology in Learning (CTL) is working with Palm, Inc., to award grants of Palm handheld computers to K-12 teachers and their students. Through the PEP program, Palm has equipped more than 175 classrooms throughout the United States with a handheld computer for every student. CTL is administering and evaluating the program, and CTL's research will help determine the impact that handheld technologies can have on teaching and learning. In this way, the PEP program will make a significant contribution to the effective use of handheld computers for education.

Grant Types

The PEP program has announced three types of awards. No requirements were specified in terms of content areas or grade levels (other than K-12). Proposals were read by an independent panel of external reviewers, who rated each proposal according to a set of criteria provided by SRI.

- *Round I Classroom Teacher Awards.* The first set of 15 awards was granted in February 2001. All awardees were classroom teachers in K-12 schools and were required to have research partners to help in the implementation of their projects.
- *Round II Classroom Teacher Awards.* All 87 Round II awardees were classroom teachers in K-12 schools.
- *PEP Research Hub Awards.* Awardees were research institutions, school districts, schools of education, etc., that committed to training and supporting a set of teachers. Each awardee received from 6 to 15 classroom sets of Palm computers.

As of summer 2001, the 15 Round I awardees had completed one semester of use, and the other awardees had received the handheld computers.

Evaluation Design and Data Sources

The two-level evaluation design consists of (1) a general evaluation, conducted by SRI, involving surveys of teachers and students and a small number of site visits; and (2) project-level evaluations conducted by PEP awardees and their project teams, with guidance provided by SRI researchers. CTL's evaluation of the PEP program has the following goals:

- General evaluation of handhelds for teaching and learning.
- Identifying key benefits of handheld computers for students.



www.palmgrants.sri.com

- Identifying drawbacks and pitfalls of handheld computers for students.
- Identifying strategies for the successful integration of handhelds into teaching and learning.

This evaluation report draws on data from 13 PEP projects that provided SRI with evaluation data as of September 21, 2001.

- *Teacher/Researcher Questionnaire*. Completed by 24 individuals (teachers and researchers) from 12 different PEP projects. The questionnaire included multiple-choice items, preference scales, and open-ended items.
- *Project Self-Evaluation Reports*. Each PEP project conducted its own evaluation, which was designed individually by each project.
- *Teacher and Student Interviews*. The SRI evaluation team conducted a limited number of interviews with PEP teachers and students. These interviews were recorded, and relevant excerpts were used as supplemental data.

Caveats

The data presented here accurately describe the early results of the Round I PEP awards. The teachers participating in the PEP program evaluation study are not representative of the teacher community in general. Specifically, Round I PEP awardees:

- Are a small population (small n).
- Have a relationship with a research institution.
- Are highly motivated technology users.



Round I PEP Awards Statistics

Round I complete proposals: 128

Accepted: 15

Grade levels:

- Primary grades: 4
- Middle grades: 5
- High school: 6

School demographics:

- Urban: 7
- Rural: 4
- Suburban: 4

- Public: 12
- Private: 3

Subject areas (main focus):

- Science: 5
- Cross-curricular: 6
- Special needs: 2
- Math: 1
- Social studies: 1



PEP Awardees' General Evaluation of Handhelds for Teaching and Learning

- 92% of respondents agreed or strongly agreed that handheld computers “are an effective instructional tool for teachers.”
- 92% of respondents agreed or strongly agreed that the use of handheld computers in learning activities “has the potential to have a positive impact on students’ learning.”
- 83% of respondents agreed or strongly agreed that “having a classroom set of handheld devices will have a positive effect on my teaching practice.”
- 67% of respondents agreed or strongly agreed that handheld computers “are more easily used in the flow of classroom activity than desktop computers.”

Benefits of Handheld Computers for Students

When asked to identify the major benefit of using handheld computers for students, teachers’ and researchers’ responses fell fairly evenly into the following three categories:

• Instructional tool

These respondents saw the instructional uses of handheld computers as the greatest benefit to students. Some respondents stated that the benefits accrued from the use of computer technology per se; others saw the instructional benefit as associated with the particular activities that handheld computers supported.

• Organizational/personal tool for students

These respondents felt that handheld computers helped students get organized, be more responsible with their schoolwork, and keep important school information ready-at-hand.

• Motivational effects

These respondents felt that the greatest benefit of handheld computers for students was the motivational effect. Respondents indicated that students found handhelds fun to use, liked using them, and felt that use of handheld computers conferred status or was a special privilege.



Drawbacks and Pitfalls of Handheld Computers for Students

When asked about “drawbacks and pitfalls” of using handheld computers for students, questionnaire respondents’ comments fell into the following categories:

- ***Behavioral***

Behavioral issues mentioned by respondents had to do with students’ being distracted by games and applications on the handheld computers.

- ***Usability***

Responses in this category mentioned various usability issues, including slowness of note-taking without a keyboard, difficulty using the stylus, and fine motor skills needed to use handheld computers.

- ***Graffiti***

Most teachers found that students easily learned Graffiti. However, some teachers mentioned the learning of Graffiti as a difficulty.

- ***Equipment loss/theft***

Equipment loss or theft was mentioned as a pitfall by several respondents. However, the actual reports of loss or theft across all projects were very few.

Teacher Perceptions of the Benefits of Handheld Computers for Teaching and Learning

The questionnaire asked the following open-ended questions about the potential of handheld computers for teaching and learning:

(1) *What teaching/learning activities do handheld devices make possible?*

(2) *What teaching/learning activities do handheld devices make easy?*

Responses to these two questions fell into five categories. Sample responses are listed under each category:

- ***Mobility/outdoor inquiry learning activities***

- Field activities are very functional. Mobility around the classroom is also nice.
- Collecting and entering data from the field making notes and observations using Graffiti or Alpha-numeric touchpad.



- The lab collection process.

Classroom management

- General classroom management and parent communication is incredibly easier.
- Scheduling group activities is made easier.

Having information ready at hand

- They allow you to transport info needed from place to place so you can utilize a variety of learning environments.
- For my students the handheld device makes certain daily functions and learning activities more student-centered and student generated.

Students' organization

- They encourage students to keep track of their progress each day.
- The To Do list prevents the students from making excuses about forgetting about a homework assignment or project.

Communication and Collaboration

- Sharing via beaming information
- Organizing, collecting and sharing data
- Beaming common information to be used by all group members is made easier.

Integrating Handheld Computers into the Classroom

Comments relating to the management of handheld computers suggest that teacher management of handheld computers and the ease with which handheld computers can be prepared for classroom use are key issues in integrating handheld computers in the classroom.¹

- Overall, there were surprisingly few instances of lost, stolen, or damaged handheld computers. Nonetheless, some teachers reported the potential for equipment loss or theft as a “drawback or pitfall” of handheld computers for students.
- Battery replacement was cited as a source of interruption and inconvenience.
- Some teachers indicated a need to develop strategies for storage, transport, and use (where to place handhelds on desk, in activities) of handheld computers.

¹ Teachers' comments about classroom management issues related to integrating handheld computers in the classroom were drawn from email communication and a teacher workshop in addition to the data sources mentioned at the beginning of this report.



Teachers described managing classroom sets of handheld computers as involving the following tasks and strategies:

- Handheld computer assignment to students (for class meeting, class use, or personal use).
- Handheld computer storage.
- Synching handheld computers to desktop computers for setting up and following through with learning activities (e.g., loading software, uploading data from handheld computers to desktops).
- Assigning specific handheld computers to a specific desktop computer for synching.
- Tracking, reviewing, and collecting students' work completed on handheld computers.
- Controlling/restricting students' use of handheld computers to on-task activities/functions.
- "Cleaning" data off handheld computers; resetting applications (for classroom-use sets).
- Recharging handheld computers; supplying and changing batteries.
- Supervising students' transport of handheld computers.
- Tagging/IDing handheld computers.

Handheld Computers as a Personal Learning Tool

Teachers and researchers saw great value in handheld computers as students' personal learning tools. In addition to helping students be organized, respondents stated that handheld computers:

- Promote students' autonomy in learning (greater independence in learning; autonomously extending learning activities outside of class time).
- Promote students' responsibility for learning and class work and enhance students' organization.
- Allow parents to be more closely involved in the classroom.

Handheld Computers "Transform" Inquiry Learning

Teachers who used handheld computers for inquiry learning reported that handheld computers have great benefits for such learning, including:

- Enhancing students' motivation and attention in data collection activities.



- Scaffolding students' measurement skills.
- Scaffolding students' interpretation of data.
- Supporting students' ability to reason from evidence.

Teachers' questionnaire comments, project evaluation reports, and products and documentation of PEP projects all clearly indicate that use of handheld technology qualitatively—and powerfully—improves inquiry-based learning activities.

Many teachers spoke of the benefits of handheld technology for inquiry learning in terms of transformation:

- A teacher using handheld computers to teach fourth-graders about the seasons stated: “In all, a typically primitive elementary science lab was transformed into a bona fide science laboratory for elementary students.”
- Another teacher who used handheld technology for middle school environmental science stated: “Students were using the technology [in the field] to analyze data in real time, drawing conclusions, and then repeating [measurements] if necessary. My students were becoming scientists and I'm not even sure they knew it. This would never have been possible in the lab.”

Handheld Computers Facilitate Classroom Communication and Collaboration

As noted earlier, PEP teachers and researchers were asked, “What teaching/learning activities do handheld devices make possible?” and “What teaching/learning activities do handheld devices make easy?” Communication/collaboration emerged as one of the five key benefits of handheld technology for teaching and learning. In most cases, this benefit was afforded by the beaming function. Respondents mentioned the following forms of communication/collaboration supported by handhelds:

- Sharing of student reflections easily in text form.
- Sharing via beaming information.
- Organizing, collecting and sharing data.
- Sharing common information to be used by all group members is made easier through beaming.
- Cooperative learning groups.



Next Steps

As noted in the Introduction, all PEP Research Hubs and all PEP Round I and Round II Classroom Teacher Awards have been made. SRI International is working with these PEP awardees to continue to collect data and evaluate the effectiveness of handheld computers for teaching and learning.

SRI International will release an evaluation report in summer 2002. The report will present the results of the evaluation of the PEP program for the 2001-2002 academic year.

Acknowledgments

The authors would like to thank the following people for their valuable contributions to the PEP Program and the findings reported here.

Stephanie Allard
Harvey Barnett
Anne Bauer
Karen Bell
Sarah Campbell
Thomas Carney
Michelle Cassidy
Jennifer Chang
Ed Cofino
Courtney Coles
Cathleen Conway
Ben Dalton
Brian Foley
Margaret Ford
Jennifer Forrey
Lila Michelle Garza
Craig Hinshaw

Robert Houghton
Charles Kramer
Rita Lewis
Nora Mazzone
Rebie Nicholson
Celeste Oprean
Ariel Owen
Treacy Owen
Tony Petracino
John Schaff
Robby Slaughter
Dale Steen
Marcia Talkmitt
David Thesenga
David Whiting
Maria Zambra