Ubiquitous Computing in Education: Invisible Technology, Visible Impact
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Introduction & Background:
Why Should We Bother?
the concept; its history; current trends, theory & research on ubiquitous computing
• What Is Ubiquitous Computing? — Mark van 't Hooft, Karen Swan, Yimei Lin & Dale Cook
• Findings from Early Research on One-to-One Handheld Use in K-12 Education — Namsoo Shin, Cathleen Norris & Elliot Soloway
• Integrating Handheld Computers into Special Education Service Delivery — Darlene Unger & Dale Cook

Teaching & Learning in Ubiquitous Environments: What Does It Look Like?
ubiquitous computing examples
• Now You See It, Now You Don't: Ubiquitous Computing Technology in K-12 Classrooms — Mark van 't Hooft, Kadee Anstadt, Paula Jameson, Janice Kelly & Karen McClain
• Using Handheld Technology in a Norwegian Sixth-Seventh Grade Classroom: Student Perceptions — Louise Minflu
• Classroom Assessment with Handheld Computers — William Penneu, Elizabeth Lynx & Larry Berger
• Learning to Teach with Mobile Technology: A Teacher Educator's Journey — Alicia R. Crowe

Ubiquitous Computing Research: What Do We Know?
• A Framework for Studying 1:1 Computing Initiatives — Andrew Zucker
• Researching Ubiquity: Ways to Capture It All — Jason Schenker, Annette Kraicik, Yimei Lin, Karen Swan & Mark van 't Hooft
• Using Handheld Technology to Move Between Private & Public Interactions in the Classroom — Philip Vahay, Deborah Taiter & Jeremy Rosselde
• Results in the Palms of Their Hands: Using Handheld Computers for Data-Driven Decision Making in the Classroom — Naomi Hupert & Juliette Heinz
• Teachers' Views of Computer Technology for Inquiry-Based Science Instruction in the Developing Country of Benin in West Africa: (Im)possibilities, Prospects, Dilemmas or Catch 227 — Issacu Gado & Mark van 't Hooft

Ubiquitous Computing in Education
ubiquitous — (adjective) being present everywhere at once
ubiquitous (pervasive) computing — digital tools available whenever and wherever needed to support human endeavor;
very much a part of our daily lives, seemingly everywhere BUT education
ubiquitous computing in education — many notions
• 1:1 computing
• mobile computing
• smart stuff

Invisible Technology, Visible Impact
“The most profound technologies are those that disappear. They weave themselves into the fabric of everyday life until they are indistinguishable from it” — Mark Weiser

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The Future of Ubiquitous Computing: How Can We Make It Work?

how ubiquitous computing can change teaching & learning

• The Ubiquitous Computing Classroom: A Glimpse of the Future Today – Karen Swan, Annette Krakoski, Jason Schenker, Dale Cook & Yimei Lin
• Ubiquitous Mobile Phone Technology & Youth: Cross National Findings – Ilene Berson & Michael Berson
• Building University Faculty & Student Capacity to Use Wireless Handheld Devices for Learning – Ed Dieterle & Chris Dede
• Using Ubiquitous Computing to Extend & Enhance Learning Experiences – Yvonne Rogers & Sara Price

Why technology to support assessment?

Educators need data that is:

• **Specific**: identifying where students need help
• **Accessible**: available to teachers in a timely manner and without restriction or logistical obstacles
• **Comprehensible**: visually clear, aligned to practice, represented in multiple formats designed to be used for different purposes and by different stakeholders

During interviews, teachers, reading coaches and program coordinators reported the following benefits:

– Efficiency of the technology
– Immediacy of the feedback loop
– Easy access to data for multiple stakeholders
– Data that are comprehensible and specific
What teachers are doing with the data:

• Supporting Conversations about student progress: with parents, students, and administrators
• Supporting the differentiation of Instruction: informing grouping and the provision of appropriate interventions and individual assignments
• Shaping Professional Development: encouraging teachers to reflect on their own practice and recognize gaps in their own understanding
• Encouraging Student Participation: providing students with clear goals and measures of progress, and allowing them to become participants in the monitoring of their own reading progress

What are schools doing to support teachers’ use of data?

• Scheduling time to consider data: Insuring adequate time for all classroom teachers to analyze data and engage in discussions about data with peers and administrators on a regular basis
• Making data public: presenting student assessment data in a hallway, meeting room, or reading resource room where students and teachers have ongoing access, or providing data in folders that are accessible to teachers, administrators and students
• Ongoing support: Insuring adequate professional development for all teachers
• Developing a sense of community: creating an environment where all teachers and administrators feel a responsibility for the academic success of every child

Emerging trends

• Increased role for students in the assessment process
• Greater engagement of parents/care-givers in understanding the role that assessment plays as a result of increased access to information
• Shift in the culture of teaching towards a dependence on data and instructionally useful information as information and data become increasingly easy to collect, analyze and access

Thank you

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Ubiquitous Mobile Phone Technology and Youth: Cross-National Findings

AERA 2007
This Presentation Explores

Mobile Phone Issues from a cross-national perspective, highlighting:

- **Potential impact** on predicted 36 million mobile phone owners aged 5–24 years in U.S.
- **Cross-national demographics** of young mobile phone users as well as their experiences with negative interactions emanating from engagement with these communication technologies.
- **Distinct usage patterns** and commonality of fostering social connections with peers across time and space.

Mobile Phone Technology

Mobile phones, also referred to as cell phones, have become as integral a part of our lives as computers and the Internet.

- Provide telecommunications to people without the constraints of needing a fixed line telephone,
- Offer greater freedom for people to communicate with one another from virtually anywhere.

Mobile Phone Technology

Affordability and versatility have expanded their role as a means of communication, and throughout the world cell phones are now in greater use than fixed line telephones (Yates, 2003).

International Consortium

In response to widespread penetration of mobile phones within youth culture worldwide, researchers, as part of an international consortium, have been tracking challenges to child safety and collaborating on identifying emerging risks associated with these technological developments (Berson & Berson, 2007).

2003 International Net Safety Meeting

Collaborative research team explored commonalities and divergences in the following areas of focus:

1. How is the social interaction of youth affected by their engagement with mobile phones?
2. What risks for exploitation have been associated with this communication technology and how are they impacted by emerging capabilities?
3. What are the mental health implications to child and adolescent development?
4. What are relevant prevention strategies that may mediate risk and foster productive and protective experiences for youth?

Integrated Survey and Interviews

Research results on mobile phone use among school-age youth 5–19 years generate a comparative analysis of findings:

- New Zealand (Yates, 2003)
- Japan (Ito, 2003)
- U.S. (Berson & Berson, 2007)
- U.K. (O’Connell, 2003)
Study Findings

Survey of 2500 school aged children aged 7–19 years (Yates, 2003)

- 46% respondents owned mobile phones, and
- 25% of this group were using mobiles to meet people whom they had not met before.

Conversely
- Only 44% of U.S. youth owned cell phones (Berson & Berson, 2007)
- Comparatively nearly 70% of young people in the U.K. use cell phones (O’Connell, 2003)

Trends in Mobile Phone Use

- Increasingly common among youth in the United States
- More ubiquitous and starts at a younger age in other parts of the world, including Japan, the U.K., and New Zealand.

Results

Despite divergences in diffusion of mobile phones among youth users, focus groups and survey results have identified cross-cultural similarities in use of mobile phone technology:

- As a means of communication and social networking with peers,
- Providing seamless connectivity within a mobile environment.

Percent of Mobile Phone Users

<table>
<thead>
<tr>
<th>Country</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
<td>76%</td>
</tr>
<tr>
<td>NZ</td>
<td>46%</td>
</tr>
<tr>
<td>Japan</td>
<td>70%</td>
</tr>
<tr>
<td>USA</td>
<td>44%</td>
</tr>
</tbody>
</table>

Technology Forecasters Predict

- An explosion in the mobile phone youth market in the U.S.
  - Estimated 28.2% rise in the number of teenage (10-15yr) mobile owners by 2007 to 13.36 million (mobileYouth 2006 report).
- 1.1 billion messages sent monthly across the U.S. networks by 5–24 year olds (mobileYouth 2003 report).
- Next generation of mobile phones to facilitate children being able to create, send, and receive photographs and video clips via handsets in both a-synchronistic time frames and in real-time.
Results (Continued)
Young people tend to focus on existing social contacts with their phones rather than broader global linkages with others, but across the studies youth, despite their enthusiasm for mobile phones, lack a critical awareness of the concomitant dangers associated with a globally connected technology that is largely utilized outside an adult-supervised context.

Conclusions
• As young people become immersed in this interconnected environment, they must not only master the tasks required by the tools but also simultaneously function as part of a networked group which is shaping the social space in which it resides.
• Youth in today’s world do not merely consume information from the diverse media sources which are accessible online, but rather they are active agents who can manipulate, adapt, create, and disseminate ideas and products through communication technologies.

Policy Implications
• As a result, youth may not have developed the capacity to respond in a judicious manner and lack skills to create a barrier from harm.
• Fostering greater awareness and proactive strategies may counter new risks that arise with advances in technology.

<table>
<thead>
<tr>
<th>Identified Risks</th>
<th>Prevention Strategies/Policy Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enticement to face-to-face meetings; Child abuse/prostitution</td>
<td>Restrictions on child access to chat via mobile phones; Tracking technology to monitor’s child’s location; Law enforcement initiatives; Safety guidelines</td>
</tr>
<tr>
<td>Cyberbullying/harassment</td>
<td>Manners; Skills in conflict resolution and problem solving; Process for logging and reporting harassing messages and numbers</td>
</tr>
<tr>
<td>Sharing graphics, photos video; Privacy invasion; Cheating</td>
<td>Training on responsible use and of technology; Integration of digital literacy into education curriculum</td>
</tr>
<tr>
<td>Clandestine tracking of children’s activity</td>
<td>Withholding access to number on children’s cell phones as well as their location</td>
</tr>
<tr>
<td>Access to porn and other unsuitable content</td>
<td>Mobile phone company codes of practice; Access controls (e.g., age verification and filtering); Classification of content; Skill development in critical analysis of media and evaluation of information</td>
</tr>
<tr>
<td>Infringements on time spent on other activities (e.g., homework)</td>
<td>Limitations on time spent on the phone; Designated use times; Restricted access to phone numbers</td>
</tr>
<tr>
<td>Excessive cell phone fees</td>
<td>Pre-paid phones</td>
</tr>
</tbody>
</table>
Looking to the Future: Emerging Trends

Students may be practicing for their standardized tests on phone applications.

http://www.apple.com/iphone/

Schools ban cell phones…

• "It's kind of ridiculous that we think we can't survive without a cell phone when people did it for thousands of years. But now that they have this invention, we should use it."
  --Elisa Muyl, 14, a freshman at Stuyvesant H.S. in New York
  http://www.cbsnews.com/stories/2006/05/12/national/main1616330.shtml

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In Conclusion

• What is ubiquitous computing in education and what does it look like?
  – Anywhere, anytime, anyone
  – Variety of learners, tools, uses, contexts …
  – Active, resourceful, communicative, mobile learners who make choices

In Conclusion

• What do we know about it?
  – Most research is still anecdotal and qualitative.
  – Need for organization and synthesis of existing research.
  – Need for more systematic research.
In Conclusion

• How can we make it work?
  – Rethinking teaching and learning to:
    • Reconnect schools with kids and society.
    • Teach and learn about and with digital tools.
    • Teach students how to use technology in safe, ethical, constructive, and responsible ways.

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