Evaluation of the technical and pedagogical mobile usability
Presentation at the MLEARN2004 Conference, 5-6.7.2004, Rome, Italy

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Introduction

- The major goal of the Digital Learning research project (01/2001 – 06/2004) is to develop a tool to evaluate usability of digital learning materials and environments (http://dll.hamk.fi/dl2).

- This paper is about the technical & pedagogical usability criteria and its mobile usability extension from which we derive the questions that are presented to the user when he/she is evaluating mobile learning material or environments.
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Introduction

- In this study, operationalization of usability attributes is based on Nielsen’s (1990, 148) model, where the top-level concept is system acceptability.
- System acceptability has two components: 1. social acceptability, and 2. practical acceptability.
- Practical acceptability is composed of cost, compatibility, reliability and usefulness (Nielsen, 1990, 148).
The Attributes of System Acceptability (Nielsen 1990)

- Social
- Practical
  - Cost
  - Compatibility
  - Reliability
  - Usefulness
Introduction

• *Usefulness* is further divided into utility and usability.

• Entertainment product has high *utility* for end user if it is fun to use, and learning material has high utility if learners learn from using it (1993, 25).
The Attributes of System Acceptability (Nielsen 1990)

- Acceptability
  - Social
  - Practical
    - Cost
    - Compatibility
    - Reliability
    - Usefulness
      - Usability
      - Utility
**Introduction**

- *Pedagogical usability* is categorized in this study into sub component of utility, as technical usability is a sub component of usability.
- Thus dialog between user and system, and learning goals set by student and teacher are both aspects of pedagogical usability.
- Technical and pedagogical *mobile usability* is an extension to the original criteria, which specifically takes into account the mobile use.
Does the learning platform, and/or the learning material embedded into it, enable student and teacher to reach their learning goals?

Usefulness

Usability

Utility

Technical mobile usability  Pedagogical mobile usability
The Attributes of System Acceptability (Nielsen 1990)
# Preceding studies concerning technical mobile usability

## Abstract

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5.7.2

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Preceding studies concerning technical mobile usability

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## Components of technical and pedagogical mobile usability

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<td>2. Learner activity</td>
<td>How personal the learning products are</td>
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<td>Cross-platform use</td>
<td>3. Cooperative learning</td>
<td>Flexibility in collaboration</td>
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<td>Attentiveness</td>
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<td>Manageability</td>
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The technical usability criteria

1. Accessibility
2. Learnability and Memorability
3. User control
4. Help
5. Graphical layout
6. Reliability
7. Consistency
8. Efficiency
9. Memory load
10. Errors
The technical mobile usability criteria

1. Accessibility
2. Learnability and Memorability
3. User control
4. Help
5. Graphical layout
6. Reliability
7. Consistency
8. Efficiency
9. Memory load
10. Errors
1. **Accessibility.** The most important point is that the learning material has no value for learner, if she is not able to use it in the first place.

- Learner should be able to use learning material with different browsers and devices. (W3C, 1999.)
The technical mobile usability criteria


- System that is hard to learn is only valuable for those users who are able to spend time to learn it.
- System that is impossible to learn has no value for any user.
The technical mobile usability criteria

3. User control. User has the feeling that the software operates for her, not the opposite way (Shneiderman, 1998; Nielsen, 1993; Tognazzini, 2003; Lin, Choong & Salvendy, 1997).

- Use of the system should be so intuitive, that no "help" is needed (Squires & Preece, 1996).
The technical mobile usability criteria

6. Reliability. System should be technically reliable.

• User should be able to trust that her work is safe with the software. (Nielsen, 1993; Shneiderman, 1998; Tognazzini, 2003).

• In mobile use the system should be relatively independent of the network coverage.
7. **Consistency.** Consistent user interface gives the user transferable skills, that are useful in other systems and contexts, too.

- User interface components should be placed in consistent way. (Shneiderman, 1998; Nielsen, 1993; Tognazzini, 2003; Lin, Choong & Salvendy, 1997; Chalmers, 2003.)

- Cross-platform use with mobile devices (Öquist, Goldstein & Chincholle, 2004, 335).
The technical mobile usability criteria

8. Efficiency of use. User should be able to adopt conceptual structure of the system in order to automatize common routines, for example with shortcuts and recordable macros (Shneiderman, 1998; Nielsen, 1993; Tognazzini, 2003).

• This includes also physical routines in use: manageability of the interface (Öquist, Goldstein & Chincholle, 2004, 333).
The technical mobile usability criteria

9. Memory load. User is at her best recognizing things, computer is much more effective in remembering things (Nielsen, 1993, 129).

- Less is more - more synchronous information available, longer it takes from the user to process it and make decisions (Nielsen, 1993).
- Also a question of attentiveness in mobile use: need to cut down the cognitive load (Öquist, Goldstein & Chincholle 2004, 330).
Preceding studies concerning pedagogical mobile usability

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<tbody>
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<td></td>
<td>&quot;Elements of Mobility&quot;</td>
<td>&quot;Properties of technology supporting mobile workers&quot;</td>
<td>&quot;Why use palmtop computers for learning?&quot;</td>
<td>&quot;Levels of objectives: mobile computers in education&quot;</td>
</tr>
<tr>
<td>Convenience-rationality</td>
<td>Lightweight and highly flexible</td>
<td>Relatively inexpensive</td>
<td>Productivity</td>
<td>Flexible physical access</td>
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<tr>
<td>Expediency</td>
<td>Allow more effective planning of activities and flexible allocation of resources</td>
<td>Possibility of ubiquitous computing</td>
<td>Flexible physical access</td>
<td>Flexible physical access</td>
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<tr>
<td>Immediacy</td>
<td>Supports effective use of dead time to plan for upcoming mobile activities and catch up with nonmobile work</td>
<td>Access to information and information literacy</td>
<td>Capturing and integrating data</td>
<td>Capturing and integrating data</td>
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<tr>
<td>Quality of life</td>
<td>Allow the location, use of, and access to locally available resources</td>
<td>Possibility of collaborative learning</td>
<td>Communication and collaboration</td>
<td>Communication and collaboration</td>
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<tr>
<td></td>
<td>Allow monitoring of remote activities more easily</td>
<td>Possibility of independent learning</td>
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</table>
The pedagogical usability criteria

1. Learner control
2. Learner activity
3. Cooperative learning
4. Goal orientation
5. Applicability
6. Added value
7. Motivation
8. Valuation of previous knowledge
9. Flexibility
10. Feedback
The pedagogical mobile usability criteria

1. Learner control
2. Learner activity
3. Cooperative learning
4. Goal orientation
5. Applicability
6. Added value
7. Motivation
8. Valuation of previous knowledge
9. Flexibility
10. Feedback
The pedagogical mobile usability criteria

2. Learner activity. Teacher role (facilitative/didactic) depends on underlying pedagogic assumptions (Reeves, 1992).

- Learning material should gain learners attention.
- Learners should feel that they own the goals of action and thus the results (Jonassen, Peck & Wilson, 1999).
- As the mobile activities are characteristically personal (Savill-Smith & Kent 2003; Turunen Pehkonen & Syvänen 2004) the gathered learning products are as well, as in e.g. ePortfolios (Sharples, Corlett & Westmancott 2002; Luchini, Quintana & Soloway, 2003).
3. **Cooperative learning.** Constructivist view is based on social learning and knowledge sharing via collaborative tasks.

- Learners are able to discuss and negotiate different approaches to the learning task (Jonassen, 1995).
- Tools might support asynchronous or synchronous social navigation (Mayes & Fowler, 1999; Kurhila, Miettinen, Nokelainen & Tirri, 2002).
- Mobile communication is a key factor in mobile learning (Nyíri 2002) and tools for this activity are asynchronous (e.g. Ketamo 2003) or synchronous (e.g. Roth & Unger 2000) containing many media types (MMS, SMS and voice).
The pedagogical mobile usability criteria

5. **Applicability.** Authentic activities and contexts: examples should be taken from authentic situations results (Jonassen, Peck & Wilson, 1999).

- Transfer - learned knowledge or skills are useful in other contexts, too.
- Learning by doing (Wilson & Meyers, 2000).
- Human development should be considered in a way that the material is relevant for target population's developmental stage (Wilson & Meyers, 2000).
- Contexts in mobile learning; context and situation dependent knowledge (Espinoza, Fagerberg, Sandin & Cöster 2003; Turunen et.al. 2004)
The pedagogical mobile usability criteria


  - Better adaptation to individual needs
  - More flexible offer of content
  - Student takes over learning functions
  - More attractive subject matter
  - Improvement of communication
  - Student is more involved.

- Added value of mobile accessibility (Sharples 2000; Savill-Smith & Kent 2003)
The pedagogical mobile usability criteria

8. Valuation of previous knowledge.
Prerequisites, what is needed to accomplish learning tasks.

- Meaningful encoding (elaboration), learner is encouraged to make use of her previous knowledge (Wilson & Meyers, 2000).
- Prerequisites for meaningful elaboration in mobile situations, where the fragmentation can be an issue (Regan 2000; Syvänen, Pehkonen & Turunen 2004)
Tervetuloa käyttämään eValuator-arviointityövälitettä, Petri Nokelainen. Voit valita allaolevista toiminnoista joko:

1. uuden arvioitavan kohteen lisäämiseen

http://evaluator.hamk.fi/evaluator_english/

Valitse toiminto, jota haluat käyttää:

1. Haluan lisätä arvioitavaksi uuden
   - oppimateriaalin
   - oppimispyyntöön

   Seuraava

2. Haluan arvioida oppimateriaalimodulin tai -järjestelmän

   Seuraava


   Hakutoimintoon

5.7.2004
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Thank you!

• Questions?
  → Contact: antti.syvanen@uta.fi
• Upcoming online publication:
  http://dll.hamk.fi/dl2/en