

# **Educational uses of handheld devices: undergraduate student experiences**

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# Overview of this presentation

- I. Introduction
- II. Literature review
- III. Research design

# I. Introduction

1. “Handheld devices”
2. “Two-level effects”
3. Problems of handheld educational uses
4. Research focus

# 1. Handheld devices



*Figure 1 Mobile phone, PDA/Palm, PPC phone*

## 2. “Two-level effects” of new ICT use

- “**First-level effects**” (Planned uses): are often associated with improved efficiency, and go hand in hand with other offsetting consequences.
- “**Second-level effects**” (Unpredicted, uncontrolled uses): are associated with changes in social practices, and in contexts in which social practices take place.

(Sproull & Kiesler, 1991, 1995, p. 4; Lankshear et al., 2000)

# Examples

- Posting annotations to public slides  
(Pinkwart et al., 2003 )
- Data collection in the field  
(Lai et al., 2005)

### 3. Problems of handheld educational uses

The booming situation of handheld uses



The effects of handheld applications

- Not achieved scale
- Impact not apparent
- First-level effects (in many cases);
- Second-level effects (a few cases) but with challenges.

## 4. This research focus

To investigate into what educational uses of handheld devices the students prefer based on their experiences, and whether these educational uses in context change their practices.



## II. Literature review

1. Define “Context”
2. Review educational uses of handheld devices
3. List technical constraints
4. Draw conclusions

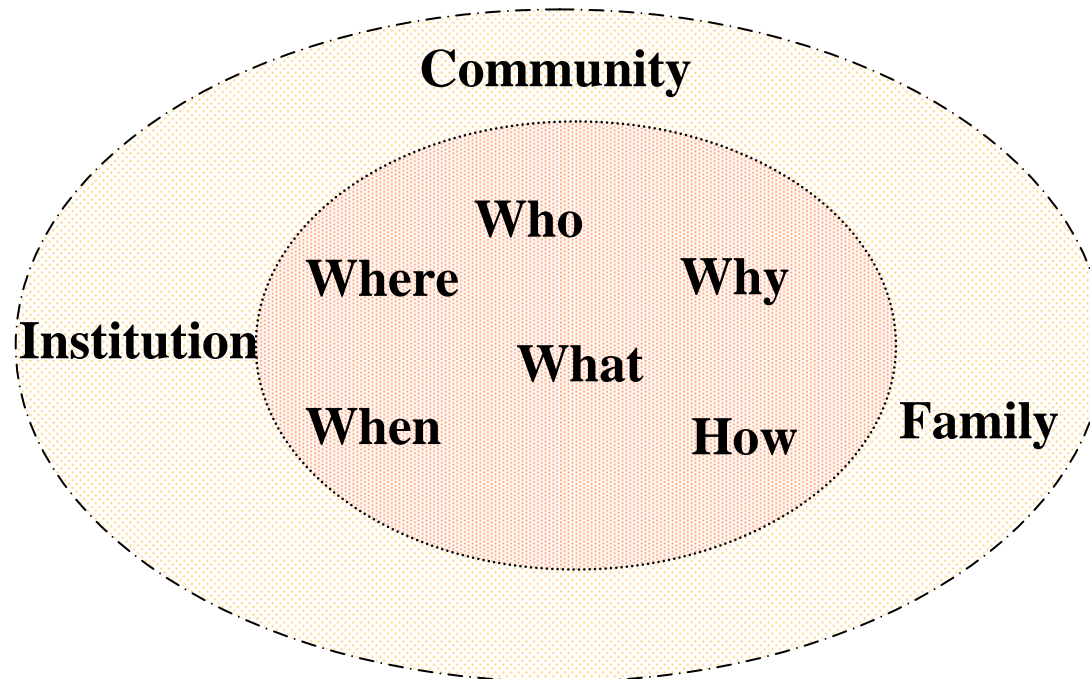
# 1. Context

- The “five Ws” (what, who, where, when, why) of context are “a good minimal set of necessary context” Abowd (2000, p. 36).
- One more dimension “how” is added (Lund, 2006).
- A specific setting is weaved together with broader cultural contexts.  
(Nicolopoulou & Cole, 1993)

# 1. Context

Two weaved-together dimensions:

- A specific context: 5 Ws, 1 H
- Broader contexts

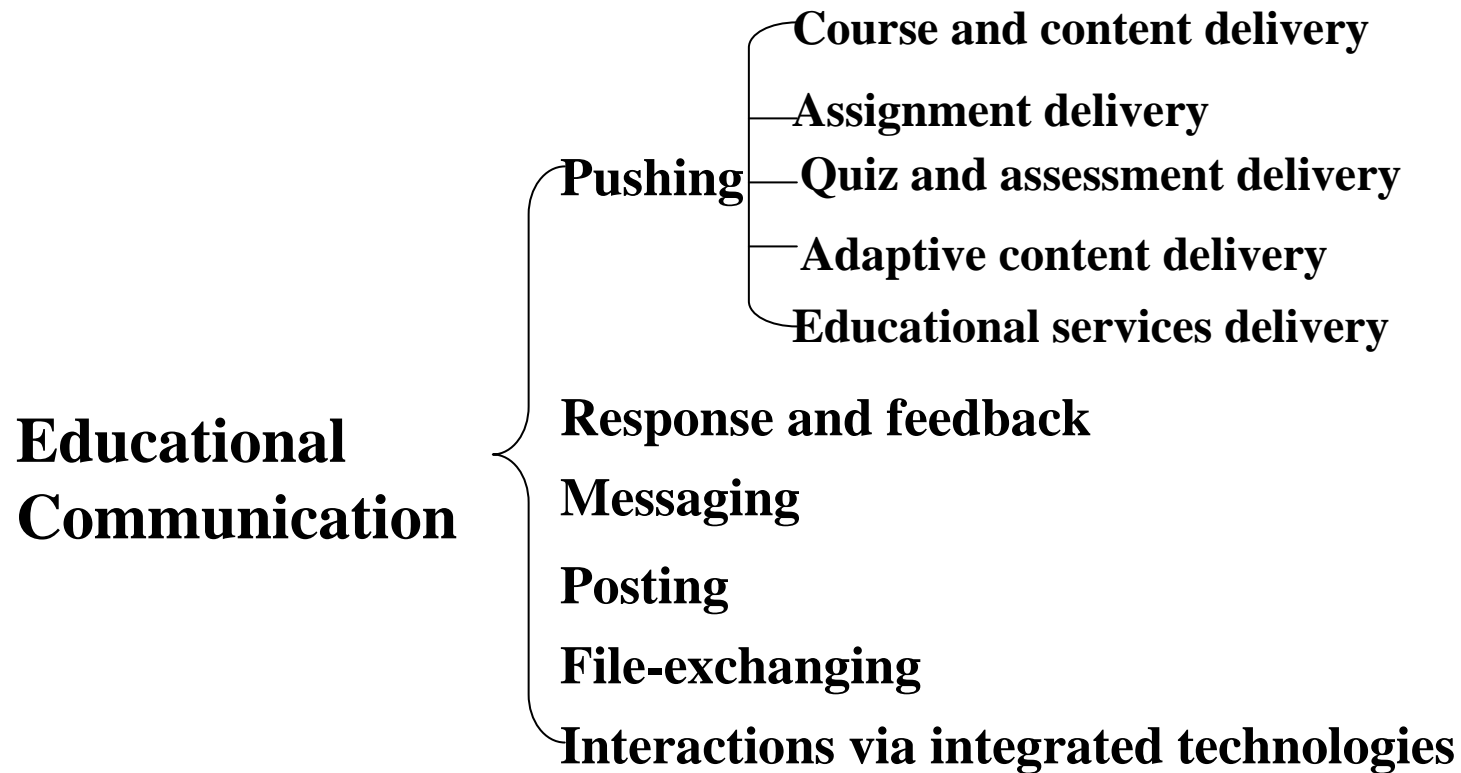


*Figure 2 Context of educational uses of handheld devices*

## 2. Review of educational uses of handheld devices

- Educational communication
- Managing
- Information seeking and handling
- Games and simulations
- Data collection
- Context-awareness
- Other educational uses

# Educational communication



*Figure 3 Educational communication*

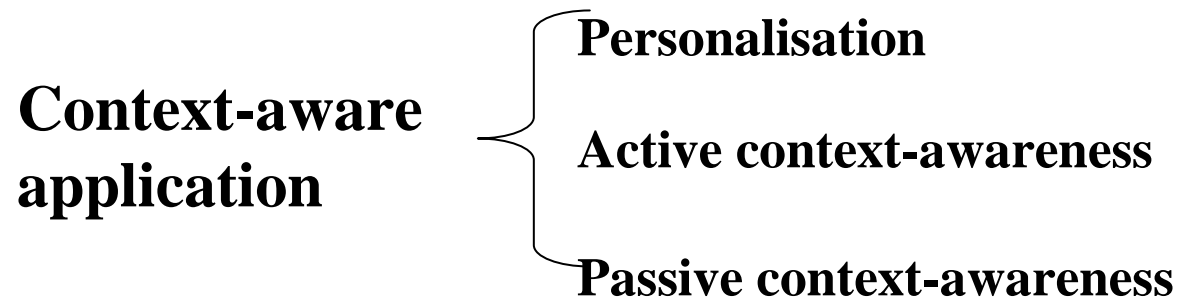
# Educational communication

## Planned uses

- As content delivery and presentation tools  
More emphasis on “where use”, “when use”.
- Complicated design for limited practices  
More emphasis on “how use”.

# Context-aware application

“If the system uses context to provide relevant information and/or services to the user, where relevancy depends on the user’s task” (Dey, 2001, p. 5).



*Figure 4 Context-aware application*

# Context-aware application

Unpredicted and uncontrolled uses but with challenges

- Needs and goals are diversified;
- Limited practices are inadequate for drawing out the general principles for the design;
- Wireless connectivity is limited to certain settings;
- Technical complications in the design are involved;
- Technical constraints are the barriers for the design.



# Using simple features of handheld devices

Jigsaw collaborative activities  
(Lai & Wu, 2006)

“Research attention should be directed at identifying those simple things that technology does extremely and uniquely well, and to understanding the educational practices by which those new affordances become powerful educational interventions” (Roschelle, 2003, p. 268) .

### 3. Technical constraints

- Screen size (e.g., Corlett et al., 2005)
- Inputting method (e.g., Ketamo, 2003)
- Connectivity (e.g., Robinson & Dodd, 2006)
- Mobile printing (e.g., Bradley et al., 2005)
- Processing speed (e.g., Sharples et al., 2002)
- Limited storage (e.g., Bradley et al., 2005)
- etc.

# 4. Conclusions

- Planned or controlled uses
- Replication of old practices
- Complicated design for limited practices
- Innovative uses with challenges
- Using simple features: scant
- Technical constraints



“First-level effects” dominant

# III. Research design

1. Research goals
2. Research rationale
3. Research questions
4. Research methodology

# 1. Research goals

- To investigate into unpredicted and uncontrolled uses of handheld devices for student educational practices.
- To fill the gap of lack of research study in educational uses of handheld devices resulting from student experiences.

## 2. Research rationale

- “What use”: the “nucleus” of this research study;
- Unpredictable and uncontrolled uses;
- These uses emerging from student experiences;
- More research needed in using available features of handheld devices in education;
- No available research in investigating into educational uses from student experiences in an uncontrolled and unexpected manner.

# 3. Research questions

## **Main research question:**

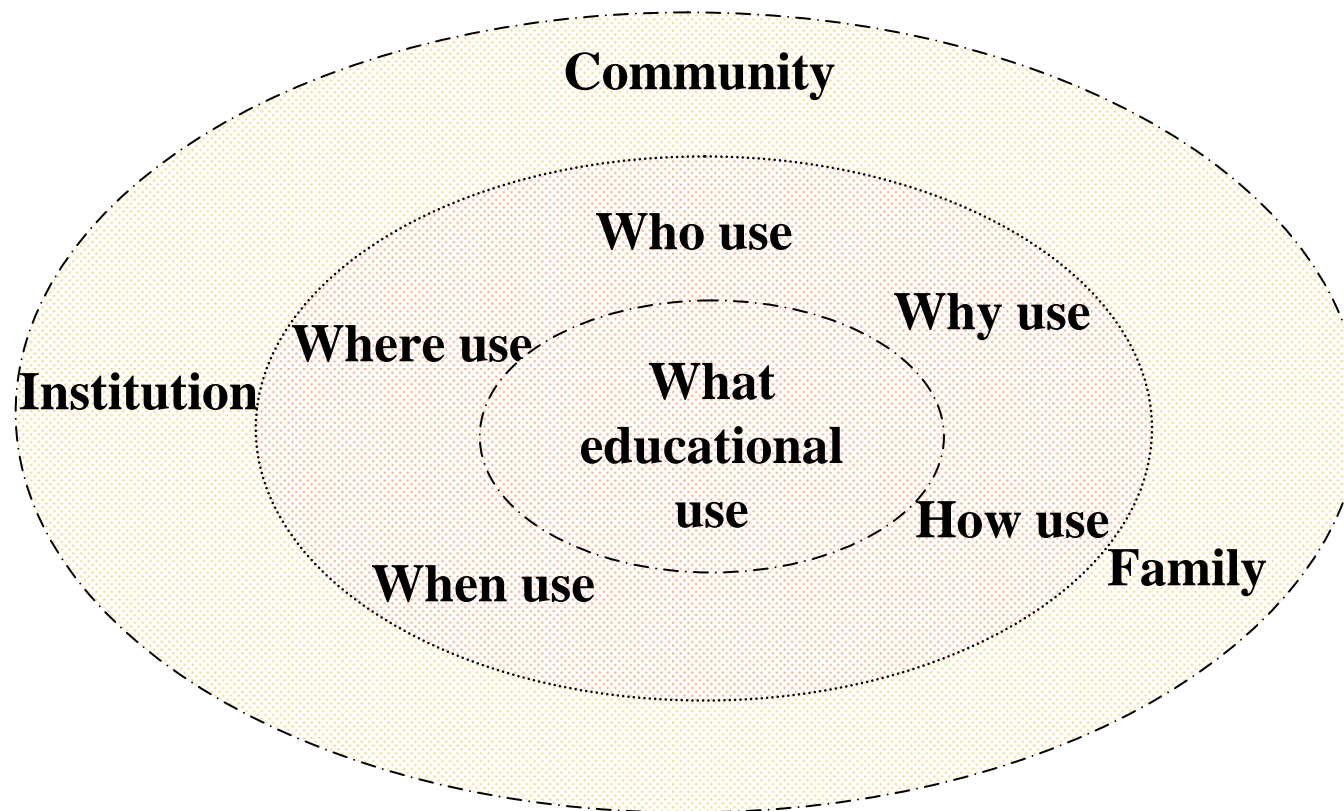
What educational uses of handheld devices emerge from undergraduate student experiences?

# Sub-research questions

- Who uses the handheld device for his/her educational practices?
- What educational uses of the handheld device does the student make for his/her educational practices?
- Where do these educational uses of the handheld device take place?
- When do these educational uses of the handheld device take place?
- Why does the student make these educational uses of the handheld device?
- How does the student carry out these educational uses of the handheld device?
- What broader contexts – family, institution and community influence these educational uses of the handheld device?

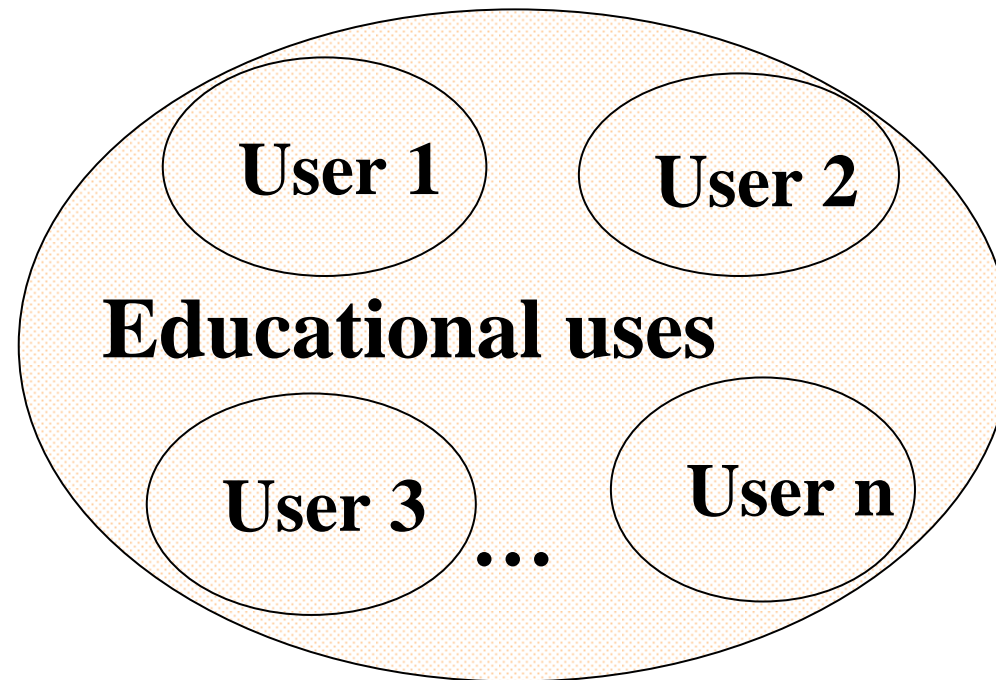


# Pictorial relationships of research questions



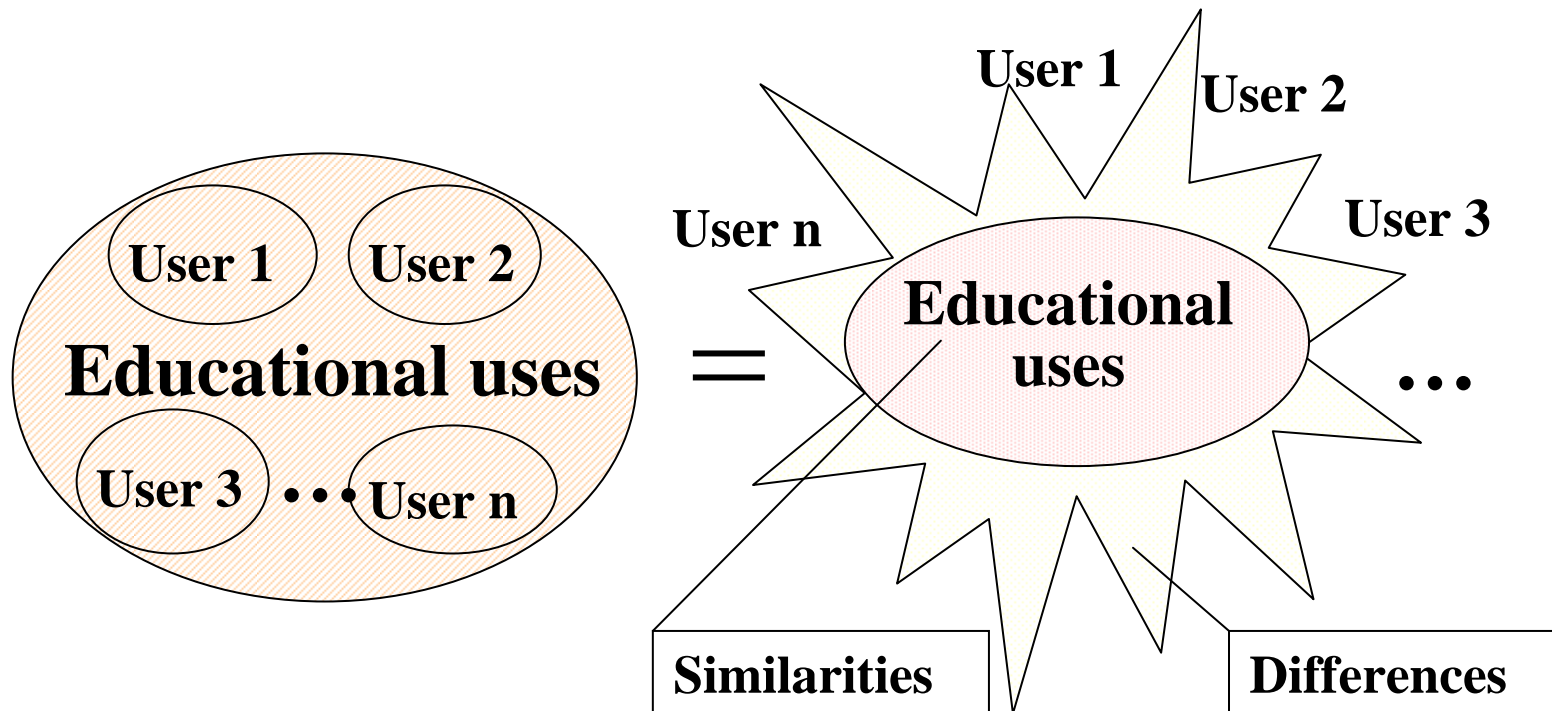
*Figure 5 Pictorial relationships among the research questions*

# Research proposition 1



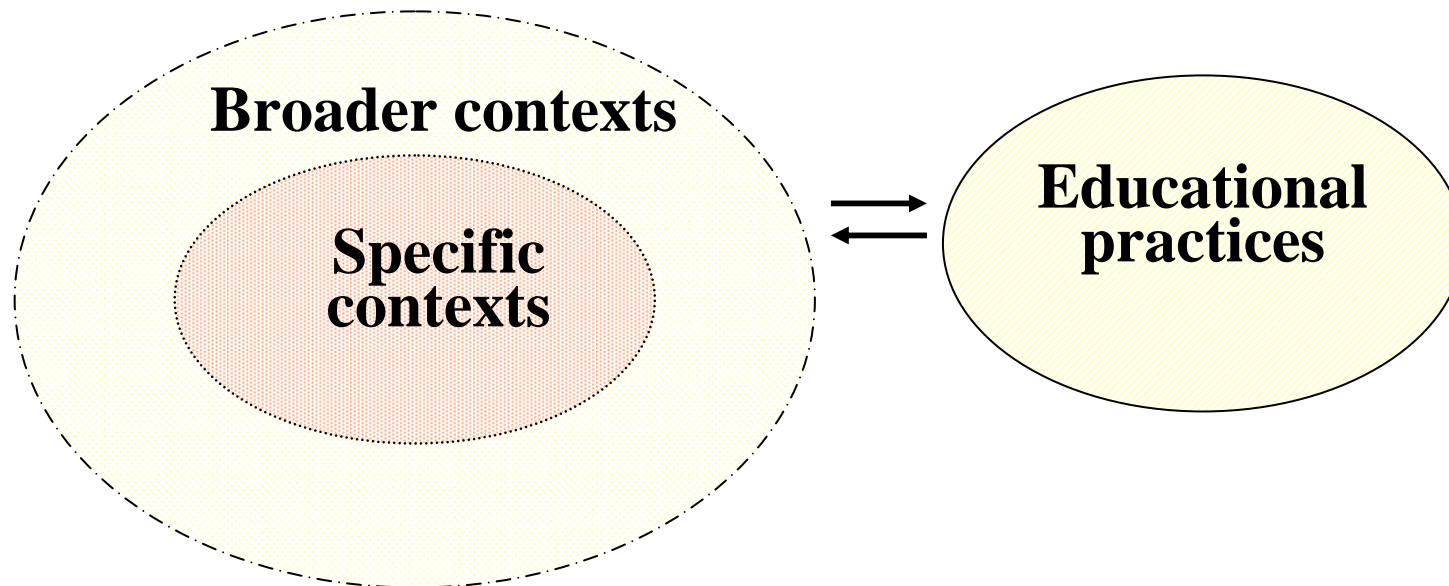
*Figure 6 Educational uses of handheld devices among different users*

# Research proposition 2



*Figure 7 Similarities and differences of educational uses of handheld devices among different users*

# Research proposition 3



*Figure 8 Two-way process of contexts of handheld educational uses and user educational practices*

# 4. Research methodology

- Qualitative research through a descriptive multiple-case study approach
  - Purposeful sampling
  - Data collection methods
  - Data analysis
  - Validity issues
  - Ethical issues
- Not going to be elaborated*
- Research procedures
  - Significance of this research
  - Limitation of this research

# Qualitative research

- These research goals meet the features of qualitative research (such as natural setting, in-depth study, process, particular context with other broader contexts; modification of research design).
- Qualitative research is called for in educational technology research (Ross & Morrison, 2004);
- Qualitative research has been used in handheld educational applications but with problems;
- No qualitative research has been done in studying handheld educational uses in complex contexts.

# Descriptive multiple-case study approach

- **A case study:** “A qualitative case study is an intensive, holistic description and analysis of a single instance...” (Merriam, 1988, p. 21).
- **A multiple-case study approach:** to gain deeper understanding of processes and outcomes of cases, to obtain rich data, and add confidence to the research findings (Miles & Huberman, 1994);
- **A descriptive multiple-case study approach:** to gain insight into participants’ handheld practices.

# Purposeful sampling

Three procedures:

- Orientation seminar
- Questionnaire survey and demographic information form
- Focus group discussion



# Data collection methods

Duration: One-year

- Interviews
- E-journals
- Artifacts created using the handheld devices
- Retrospection

# Research procedures

Stage 1: Preparation for the multiple-case studies

Stage 2: Trial of preliminary research plan

Stage 3: Adoption of modified research plan

Stage 4: Pulling things together

# Significance of this research

- No such research study has been done before. This research attempts to fill the gap.
- The result will help establish a clearer understanding of the educational uses and constraints of handheld devices.
- The result will help avoid developing “one-size for all” learning resources.
- Future research needs to be focused less on design complicated learning systems, more on the implementation process of reusable resources.
- This research result will also help understand that handheld devices cannot replace other devices such as desktops as they are different technologies; hence, educational uses of handheld devices should not be used exclusively.

# Limitations of this research study

- The number of the cases is limited.
- Most of the data collection methods are concerned with verbal reports.
- This research design needs further modification in order to render rich descriptive data.
- The result cannot simply be generalised.

Thank you!

# Managing Information seeking and handling Games and simulations

- Planned uses
- Replication of old practices using computers
- Emphasis “where use”, “when use” or “how use”, de-emphasis other “uses”, and other contextual influences.

# An example of artifact



*Photo of a product made in a training course*