

Designing for usability in e-learning contexts

Florence Dujardin
Sheffield Hallam University (UK)
EIDC conference, November 2005



Sheffield Hallam University

Meeting the challenge of e-learning

- High expectations
 - delivery
 - multimedia
 - flexibility
 - ‘interactivity’
- The reality
 - poor rate of completion
 - limited impact
- What is the problem?
 - ‘pedagogical usability’

Discussion plan

- What is e-learning?
- What is usability?
- Usability in e-learning
- Characteristics of adult learners
- Instructional design
- Implications for e-learning design
- Evaluation of e-learning

How would you define e-learning?

Wikipedia

- “computer-based training or education which incorporates technologies that support interactivity beyond that which would be provided by a single computer...
- used to support distance-learning, and may also be considered to be a form of flexible learning where just-in-time learning is possible. Courses can be tailored to specific needs and asynchronous learning is possible”

What is usability?

ISO 9241-11 (1998)

Ergonomic requirements for office work with visual display terminals – Part 11: Guidance on usability

- “the extent to which a product can be used by specified users to achieve specified goals in a specified context of use with effectiveness, efficiency and satisfaction”

Software example: library catalogue

[Connect to text only version of this catalogue \(login: opac\)](#)

Library
Catalogue

Catalogue
search and
menu

Self-service
login

Serials
search

Media
search

Theses
catalogue

LitSearch
(Information
Databases)

[Login to Athens](#)

- Using the catalogue
- Examination papers
- Electronic learning resources
- Reading lists
- Subject guides
- Suggest a resource
- Other libraries' catalogues

- Opening hours
- Contact us

Search the catalogue by

Keywords	Words in titles, subject headings, notes, publishers and names
Name	People, organisations and conferences
Title	Includes series titles
Name and title	One name and any word from the title
Subject heading	Library of Congress subject headings
Subject number	Dewey Decimal classification number
ISBN/ISSN	International Standard Book/Serial Number

Try our tutorial on [Searching the Library Catalogue](#)

Members of SHU both on and off-campus

Use [Login to Athens](#) to access

- electronic journals
- electronic books
- electronic resources in LitSearch

Use [Self-service login](#) to:

- renew your loans
- place holds
- access examination papers
- set up e-mail alerts for new items
- check your record
- modify your pin
- modify personal information for [e-mail notices](#)

E-learning example: Master's module

The screenshot shows a web browser window displaying an e-learning platform. At the top, there is a navigation bar with several tabs: "My SHU", "Learning Online", "Learning Support", "Managing My Studies", "Services for Students", "My Faculty", and "My Page". To the right of these tabs are icons for "Home", "Help", and "Log Out".

Below the navigation bar, the breadcrumb trail reads: "COURSES > COMMUNICATION PLANNING AND THEORY (A-2005... > ANNOUNCEMENTS".

On the left side, there is a vertical menu with a dark orange background and white text. The menu items are: "Read me first!", "Confirm receipt", "Introducing yourself", "Calendar", "---", "Communication Announcements Tools", "Module tutors", "----", "Comm. theory", "Doc. evaluation", "Audience analysis", "Preparation task", "Readings", "-----", "SAQ answers", "Assignment", "Development record", and "Feedback".

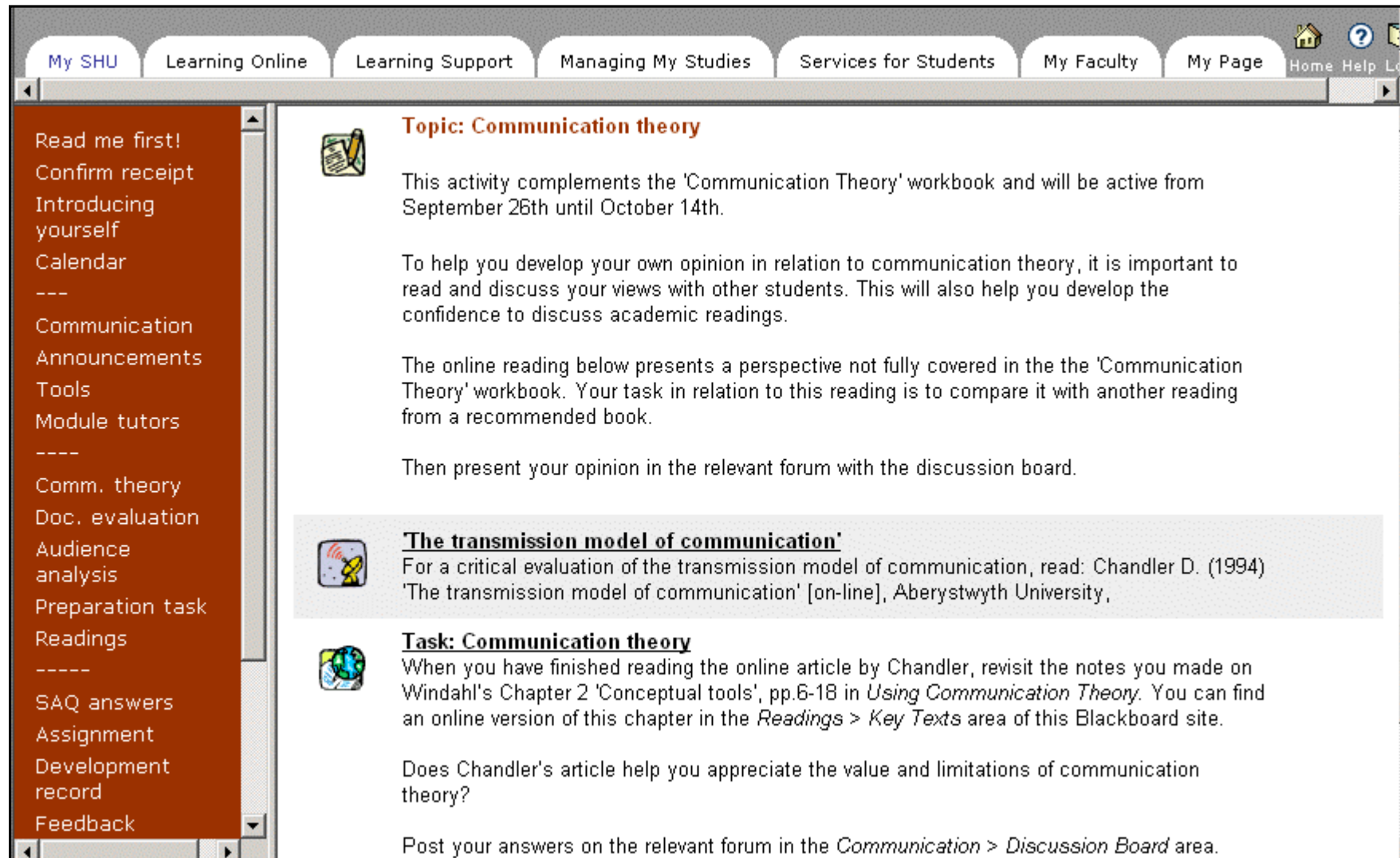
The main content area features a large, stylized illustration of a lecturer pointing at a screen while three students sit in front of him. Below the illustration, the title "Communication Planning and Theory" is displayed in a large, bold, black serif font.

Underneath the title, there are four buttons for viewing announcements: "VIEW TODAY", "VIEW LAST 7 DAYS", "VIEW LAST 30 DAYS", and "VIEW ALL". The "VIEW LAST 30 DAYS" button is currently selected.

Below the buttons, a date range is shown: "October 31, 2005 - November 07, 2005".

The main announcement is dated "Thu, Nov 03, 2005" and is titled "Document Evaluation Task - extension". It is posted by "Kirsty EDWARDS". The text of the announcement reads: "Hi Everyone, I've extended the deadline for the document evaluation task for another week until November 11th, as it seems to be a very productive task in providing a new perspective for students. There is not only value in doing the task yourself, but also in reading how other".

E-learning example: educational task



The screenshot displays a Blackboard LMS interface. At the top, there is a navigation bar with tabs for 'My SHU', 'Learning Online', 'Learning Support', 'Managing My Studies', 'Services for Students', 'My Faculty', and 'My Page'. On the right side of this bar are icons for Home, Help, and Log Out.

On the left side, there is a vertical navigation menu with the following items: 'Read me first!', 'Confirm receipt', 'Introducing yourself', 'Calendar', '---', 'Communication Announcements', 'Tools', 'Module tutors', '----', 'Comm. theory', 'Doc. evaluation', 'Audience analysis', 'Preparation task', 'Readings', '-----', 'SAQ answers', 'Assignment', 'Development record', and 'Feedback'.

The main content area features a section titled 'Topic: Communication theory' with a document icon. The text below reads: 'This activity complements the 'Communication Theory' workbook and will be active from September 26th until October 14th. To help you develop your own opinion in relation to communication theory, it is important to read and discuss your views with other students. This will also help you develop the confidence to discuss academic readings. The online reading below presents a perspective not fully covered in the the 'Communication Theory' workbook. Your task in relation to this reading is to compare it with another reading from a recommended book. Then present your opinion in the relevant forum with the discussion board.'

Below this is a highlighted section titled 'The transmission model of communication' with a satellite icon. The text reads: 'For a critical evaluation of the transmission model of communication, read: Chandler D. (1994) 'The transmission model of communication' [on-line], Aberystwyth University,'.

The next section is titled 'Task: Communication theory' with a globe icon. The text reads: 'When you have finished reading the online article by Chandler, revisit the notes you made on Windahl's Chapter 2 'Conceptual tools', pp.6-18 in *Using Communication Theory*. You can find an online version of this chapter in the *Readings > Key Texts* area of this Blackboard site. Does Chandler's article help you appreciate the value and limitations of communication theory? Post your answers on the relevant forum in the *Communication > Discussion Board* area.'

Pedagogical usability

Kukulska-Hulme and Shield (2004):

- “the effectiveness with which students learn according to stated learning outcomes, the efficiency with which students interact with the website, and the enjoyment or level of satisfaction gained from such interaction”
- Any limitations to this definition?

Four layers of usability

discipline-specific criteria

Needs and outcomes dependent on content

pedagogical criteria

Pedagogical strategy, study materials, study behaviour

general criteria

Navigation, accessibility, legibility

technical criteria

Links, download time, plug-ins, accurate HTML

(Based on Kukulska-Hulme and Shield (2004))

Glossary items

○ Pedagogy

- the art, occupation, or practice of teaching.
Also: the theory or principles of education;
a method of teaching based on such a theory.

○ Learning outcomes

- Learning outcomes are statements of what is expected that a student will be able to DO as a result of a learning activity.

Start with the learners



- “A knowledge of learners’ needs and behaviours is central to successful e-learning” (Kukulska-Hulme and Shield 2004)
- Your sense of audience will affect what you say and how you construct and express ideas.
- The more specific you are, the greater chance you have to create interesting, effective e-learning materials.

Barriers to learning

Learning require learners to:

- decode new words
- create new meanings
- maintain a large number of concepts in working memory
- review prior knowledge
- create connections to build new knowledge

Learner-centred design

Not all learners have the necessary...

- motivation
- confidence
- ability
- prior experience

to make decisions concerning...

- the importance of the topic
- the depth of understanding required
- the length of time needed to spend on a topic
- the activities needed to develop knowledge.

Interactivity in e-learning

- Interactivity does not mean:
 - watching multimedia
 - deciding where to go next
 - recognising information
- Interactivity means:
 - engaging in deep mental activity
 - analysing and recognising relationships
 - developing personal overviews
 - evaluating knowledge
 - integrating feedback into thinking
 - submitting 'work'

Instructional design

- Robert Gagné
- *Principles of Instructional Design* (1992)
- Principles first designed for military training in 1960s
- Commonly used in education (USA)
- Focus on intellectual skills
- 'Instructivist' approach may be criticized (current thinking is 'constructivist')
- Nine 'events of instruction'

Nine events of instruction

- 1) Gain attention
- 2) Inform learners of learning objectives
- 3) Stimulate recall of prior learning
- 4) Present stimulus material
- 5) Provide guidance on learning experience
- 6) Elicit performance (practice)
- 7) Provide feedback (on practice)
- 8) Assess performance 'formally'
(against learning objectives)
- 9) Enhance retention and transfer

Checkpoint

So far, you have learnt about:

- learners
- instructional theory
- some implications for e-learning design.

You are now going to consider:

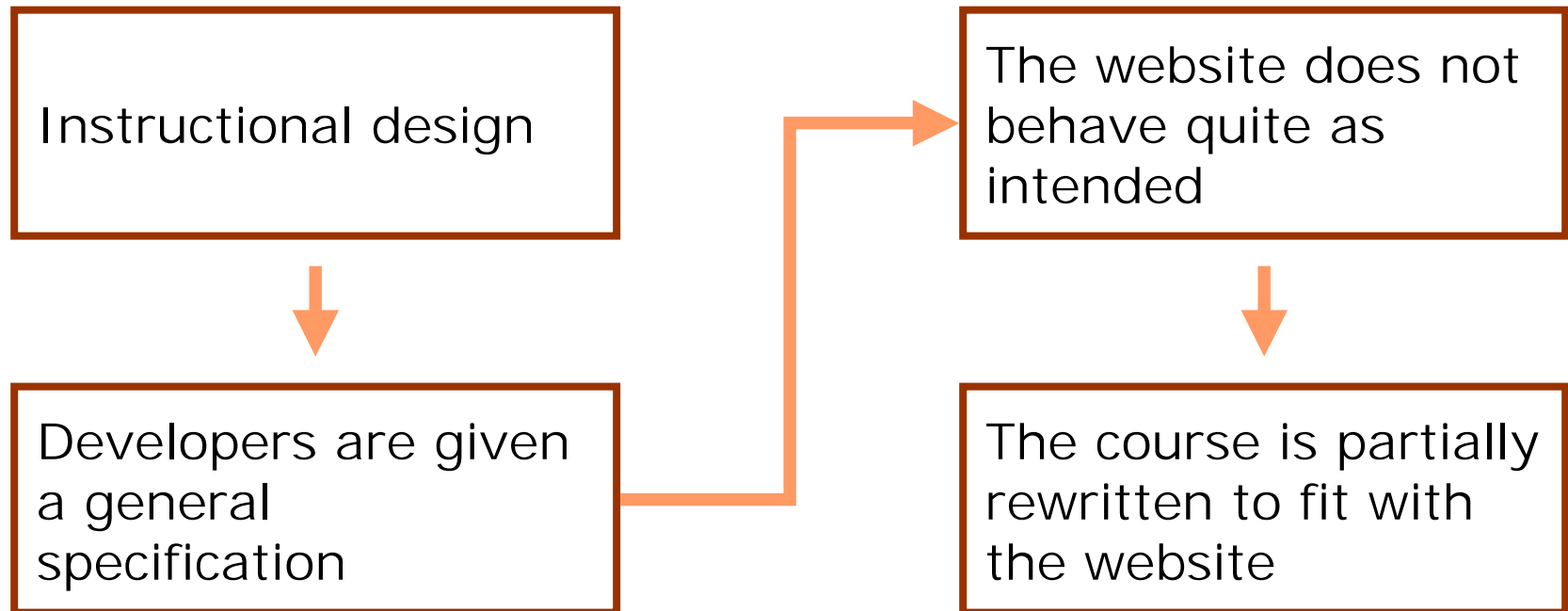
- the challenges of designing for e-learning usability
- the importance of process
- the need for evaluation.

Challenges for pedagogical usability

- You are taking learners through a tool they don't know, to learn something they don't know
- To encourage learners to engage with e-learning, you need to create:
 - an *environment* that makes learners think
 - an *interface* that supports 'learning while doing'
 - *interactions*
 - with other materials (online, printed)
 - with people (tutors, learners, workplace)

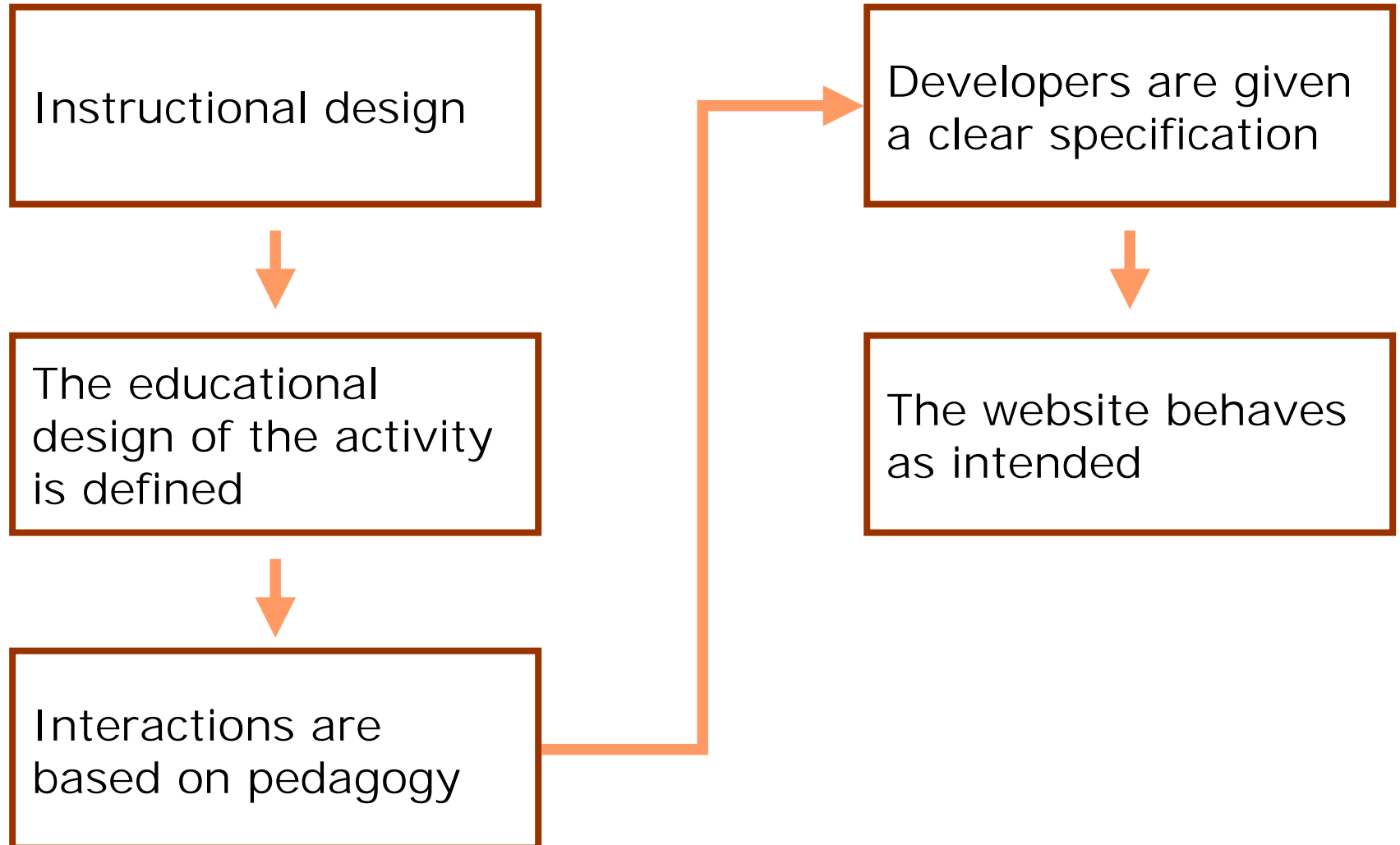
Technology-driven design approach

© 2003 A. Kukulska-Hulme, L. Shield & A. Muir



Pedagogy-driven design approach

© 2003 A. Kukulska-Hulme, L. Shield & A. Muir



© 2005 Sheffield Hallam University

Key tips

- Make the role of the site clear
- Be pedagogically driven
 - learning outcomes
 - contents and activities
 - assessment and feedback
- Integrate with other learning resources
- Organise the site to meet learners' needs and expectations
- Make navigation simple
- Write clearly
- Ensure editorial quality
- Provide a printer-friendly version

(Based on Kukulska-Hulme and Shield (2004))

A paradox

“There is an interesting paradox in the case of some educational applications, where a seamless fluency of use is not necessarily conducive to deep learning. The learner needs to move effortlessly to the conceptual level, but then must engage with the underlying meaning. To put it simply, the software must make the learner think.”

(Mayes and Fowler 1999)

Evaluating e-learning usability

- Paper prototyping
- Heuristic evaluation against guidelines
 - usability guidelines (e.g. Nielsen)
 - pedagogical guidelines (e.g. Gagné)
- Learner observation
 - computer logs (time, degree of completion)
 - talk-aloud protocols (ease of use)
 - interviews or focus groups (satisfaction)
 - knowledge check (assessment)
- Surveys

To conclude

- Pedagogical usability is a critical factor in the success of e-learning
- E-learning is 'usable' when it helps users achieve learning goals
- Need for education/training experts and technical experts to work together
 - learning theory (adult learning and instructional design)
 - designing and testing for usability

Your thoughts

Any...

- questions?
- comments?
- suggestions?

Thank you

Florence Dujardin (a-f.dujardin@shu.ac.uk)

References

- Barnum C.M. (2002) *Usability Testing and Research*, Allyn and Bacon
- Clark r.C. and R.E. Mayer (2002) *E-learning and the Science of Instruction*, Pfeiffer
- Garrett J.J. (2002) *Elements of User Experience*, New Riders Press
- Kukulska-Hulme A., L. Shield and A. Muir (2003) 'Top 10 Tips for Website Usability', Open University paper
- Kukulska-Hulme A. and L. Shield (2004) 'The keys to usability of e-learning websites', Networked Learning Conference
- Mayes J.T. and C.J. Fowler (1999) 'Learning Technology and usability: a framework for understanding courseware', *Interacting with Computers*, vol. 11, pp.485-497
- Preece J., Y. Rogers, H. Sharp (2002) *Interaction Design: Beyond Human-Computer Interaction*, Wiley
- Quesenbery W. (2003) 'The five dimensions of usability', pp.81-102 in Albers A. and B. Mazur (eds) (2003) *Content and Complexity: Information Design in Technical Communication*, Lawrence Erlbaum
- Shambaugh N.N. and S.G. Magliaro (2005) *Instructional design*, Allyn and Bacon
- Travis D. (2003) *E-Commerce Usability: Tools and Techniques to Perfect the On-Line Experience*, Taylor and Francis