Web-Based Training and E-Learning
Hauptseminar “E-Learning” – Sommersemester 2008

Stefan Karl
LFE Medieninformatik
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Agenda

- Introduction
- Definition
- Advantages
- Disadvantages
- Requirements for a good WBT-system
- Additional features of some systems
- Three examples
- Comparison
- Conclusion
Introduction

- Internet-technology got improved since the 1990s:
  - Faster internet-connections
  - Mobile internet-access
  - New technologies like PHP → enabled interaction in web applications
  → More potential for web-based training

- New needs for learning and training in modern society
  - People have to be lifelong learners
  - Learning should be done more flexible
  → Web-based training can realise that
Characteristics of WBT

Definition:

- Subset of E-Learning
- A system, which provides learning-content is called a web-based training system, if..
  - it uses the world wide web infrastructure
  - it makes use of the special features of the www (to gain advantages to normal learning)
  - It’s contents is adapted to the www
Characteristics of WBT

Advantages:

- Accessible from everywhere
  - Enables distant learning
  - Fast submission of new or updated contents
- Accessible at every time
  - Enables on demand learning
- More scalable
  - Size of the learners’ group has no effect on the tutors effort
- Single point of access
- Effective use of resources
Characteristics of WBT

Disadvantages:

- Staff may simply put existing material on the web without redesigning it
  → bad usability
- Low bandwidth can prohibit people from using WBT-systems
  - Some users do not have high speed internet access
  - Multimedia-add-ons can cause huge amount of data traffic
  → Consideration: Support for all users or many multimedia-features?
- Too less privacy protection
  - Sensible information (e.g. about the user’s knowledge) is stored in user profiles
  - Third party institutions can be interested in gaining access to that information
  - Access to the user profile information has to be secured
  - Not implemented in current WBT-systems
Basic Requirements (1)

- **Good Usability**
  - Clear structure and navigation of the learner’s interface
  - A good search-engine for contents should be provided
  - Compatible with the existing working-cycles of the tutors and content providers/editors
  - Effort for the tutors and editors should not be increased

- **Integration of Existing Material**
  - Own contents and applications
  - Third party contents and applications from the web
    → has to be compatible with existing standards
Basic Requirements (2)

### Modularity
- New parts should be easy to integrate
- Easy replacement and improvement of existing parts
  → Additional internal interfaces are necessary

### Reuse of Content
- Content separated into content elements
- A description of the content element’s semantic has to be added (→ Semantic Web)
- Description is stored in a manifest (meta-file, e.g. in XML)
- Manifest is added to the related content element
  → Automatic or manual reuse of content elements
Basic Requirements (3)

Customisable to the Context

- Different versions for different use cases or different sub sides
- Different presentations for different terminals (e.g. mobile phone, PDA, PC)
- Contents divided into content elements, arranged in different ways

Customisable to the Learner

- Customisation to a single user:
  - Adapted to the learner’s knowledge, requirements, etc.
  - Information about the user’s context has to be stored in user profiles
- Customisation to groups/types of users
- Semantic description of the contents is not sufficient
- Manifest amended with navigation rules
  - Information gained by asking or observing the user
Additional Features (1)

Profiling Exercises

- Results of the exercises should change the user’s knowledge-value stored in the profile
- Additional information has to be added to the manifest of the content element
- Gives the learner a clue about the own knowledge

Feedback and Hints for the Learner

- Feedback about the learning progress
- Hints, what helped other learners in similar situations
- Storing that information in the user’s profile or the content element’s manifest is not sufficient
- An additional structure in the database should be added to store such information
Additional Features (2)

- Feedback for the Tutor
  - about the user’s learning progress
  - about the usefulness of the different content elements

- Communication Between the Users
  - Via discussion boards, chats, (private) messaging systems and comments
  - Purpose: Discussing about the learning material

- Collaboration
  - Working together on projects
  - Solving exercises in groups
    - Interface for the tutor: groups solution will be shown, possibility to assign marks
  - Space has to be reserved for each group with access rights for all members and the tutor
Different approaches of WBT

- Early WBT-System of Technikum Joanneum (1997)
- UCL Key Skills Model (2002)
Early WBT-System of Technikum Joanneum (1)

- Developed in 1997 → one of the first “WBT”-systems
- Good requirements stated in the development phase
  - Integration of existing material
  - Reuse of content
  - Modular design
  - Customisability
- Simple system based on HTML with multimedia plug-ins
  → Stated requirements could not be fulfilled
- Tutors had to edit html-pages (no interface)
- Students used the system with a simple web-browser
- Content reusable in a simple manual way, no manifest with description
- Tool “TopClass” for user management, but not customisable to the user’s context
Early WBT-System of Technikum Joanneum (2)

Fig. 1: The interface of the system of Technikum Joanneum (Koubek et al., 1997).
Early WBT-System of Technikum Joanneum (3)

- Usability is ok, but improvable (structure ok, no search function)
- Not customisable to users or user-groups
- Limited customisable to the context of different use cases, only manual by the editor
- No real modularity
- No easy reuse of content or integration of existing material

→ Does not fulfil all requirements

- No additional features like exercises, feedback, discussion boards

→ Bad WBT system, suits to the evaluation result: No improvement of the learning efficiency
UCL Key Skills Model (1)

- Developed in 2002 by the University College London (UCL)
- Provides an central access point to all contents and also customised pages
- Contents are divided into content elements (for reuse in different contexts)
- Profiling exercises
  - Only for download (offline exercises)
  - Not to amend user profiles with data
- A meta search is provided
- Well structured interface

Fig. 2: Main entrance and departmental sites in UCL (McAvinia and Oliver, 2002).
UCL Key Skills Model (2)

Fig. 3: Main page of the UCL Key Skills System (McAvinia and Oliver, 2002).

Fig. 4: Sub page of the UCL Key Skills System for the Geography department (McAvinia and Oliver, 2002).
UCL Key Skills Model (3)

- Good usability (good structure + meta search)
- Reuse of content and integration of exiting material only manually
- Not stated if it is built modular
- Customisation to contexts only in a manual way
- Not customisable to the user’s context
- Also does not fulfil all requirements

- No additional features

- Not very good WBT-system, but better than the first one
Knowledge On Demand (KOD) (1)

- Developed in 2002 with a focus on reusability of contents and customisation
- Contents reusable, common content format
  - Interchange of content possible
- Uses a user profile for each user
  - Short questionnaire at the first access
  - Automatically updated (e.g. after profiling exercises)
- Customisable, also to the user’s context through additional information in the content objects
  - manifest (XML file):
    - Meta-data, rules, suitable exercises, agents, …
  - Knowledge packing format, improvement of IMS
- Uses agents to arrange the contents according to the user profile and the manifest
Knowledge On Demand (KOD) (2)

Fig. 4: Personalised KOD-Interface (Sampson et al., 2002).
Knowledge On Demand (KOD) (3)

Fig. 5: Knowledge packing format in KOD (Sampson et al., 2002).
Knowledge On Demand (KOD) (4)

Fig. 6: The architecture of KOD (Sampson et al., 2002).
Knowledge On Demand (KOD) (5)

- Usability is ok, but improvable
- Not stated if it is built modular
- Reuse of contents and integration of existing material is supported
- Customisable to different contexts
- Customisable to each learner
- Nearly all requirements are fulfilled

- Provides profiling exercises and questionnaires
- No additional hints for the learner, feedback or communication, but possible to implement
- No privacy protection (stores user profiles)

- Best WBT-system of the reviewed systems, but it still has a little lack of:
  - Additional features
  - Privacy protection
Comparison (1)

Fulfilled requirements:

<table>
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<tr>
<th>Requirement</th>
<th>Early system of Technikum Joanneum</th>
<th>UCL Key Skills Model</th>
<th>KOD Model</th>
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<td>Good usability</td>
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<td>Integration of existing material</td>
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<td>Modularity</td>
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Comparison (2)

Provided additional features:

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<td>Profiling exercises</td>
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<td>Feedback and hints for learners</td>
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<td>Feedback for tutors</td>
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Conclusion

- Non of the reviewed systems is perfect
- Newer system are better than older ones (impact of the www-evolution)

- Three main problems:
  - Too little information about the user's activities in the system
  - Too little information about the learner's needs
  - Missing of adequate additional information, like navigation rules for the content elements
  - Solved by KOD

- Best system: Knowledge on Demand (KOD)
  - Main drawbacks:
    - Possible features are not implemented → little additional features
    - No protection of the learner's privacy (despite use of user profiles) → common problem of many WBT-systems

- Implementation of a very good WBT-system in the near future is possible, but the issue of privacy protection should be solved