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Kunert, Tibor; Krömker, Heidi :

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Designing a Learning Dialogue for Educational Applications in Digital Interactive Television

Tibor Kunert & Heidi Krömker

Technical University of Ilmenau

Institute of Media Technology

98694 Ilmenau, Germany

{tibor.kunert, heidi.kroemker}@tu-ilmenau.de

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T-learning, learning dialogue, instructional design, usability

Introduction

Digital interactive TV (iTV) is being considered as new technology for education and learning [Bates, 2002]. ITV holds potential for learning in the home as well as in workplace settings as component of corporate distant learning strategies, e.g. as instrument for technical and management training [Bullinger & Brossmann, 1997]. This paper examines the design of a learning dialogue for educational iTV applications. A learning dialogue is the exchange of information between learner and learning system. Typically this is realised by question & answer modules. For the educational success of multimedia learning applications the activation and involvement of the learner by asking questions is particularly significant. The answering of questions is more likely to cause the cognitive operations needed for learning than the reception of presented content alone [Kerres, 2001].

Starting Point

The developed learning dialogue has been designed for an existing application prototype called "LexiTV MHP", based on the Multimedia Home Platform (MHP). MHP developed by the Digital Video Broadcasting (DVB) project is the open standard for interactive digital TV and is increasingly being supported by the international broadcasting industry as well as by governments worldwide [DVB, DVB-MHP]. The "LexiTV MHP" prototype has been presented to the public at the "Internationale Funkausstellung" (IFA) 2003 in Berlin and had been developed by the Institute of Media Technology of the Technical University of Ilmenau, Germany for the German regional public broadcaster "Mitteldeutscher Rundfunk" (MDR) that is part of ARD.

Example iTV Learning Dialogue

Different types of questions as well as different ways to provide feed-back to the learner have been investigated. Design and prototype development are based on the didactic key elements of learning dialogues as well as on the specifics of MHP. A concept has been developed that enables intuitive answering of questions and easy navigation within and between educational contents. Prototype development has been carried out using Alticast's MHP authoring software AltiComposer and AltiFusion.

The following question types have been designed, implemented and evaluated: Multiple choice quiz (text), multiple choice (images and animations), allocation of words to images in a specific order, gap-text with pull-down menues and an individual learning control:

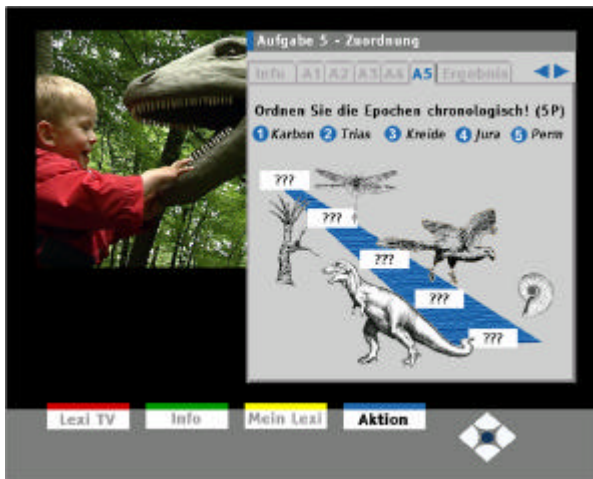**Figure 2.** Multiple choice question with images and animations

Figure 3. Allocation of words to images in specific order

Figure 4. Gap-text with pull-down menus with three options each

Figure 5. Individual learning control

Usability Evaluation

In order to support the individual learning experience iTV applications need to be easy to use. Therefore the developed learning dialogue prototype has been evaluated regarding usability. The Methods of end-user testing with thinking-aloud protocol and observation as well as structured personal interviews directly after the tests have been combined [Shneiderman, 1998]. The tests were conducted in the usability lab of the Institute of Media Technology at the Technical University of Ilmenau, Germany. Because the developed learning dialogue can be integrated in various educational iTV applications, the usability evaluation has been carried out with heterogeneous test users: Six test users in the age between 12 and 40 with very different experiences in TV, teletext and internet usage. The following aspects have been evaluated in particular: (a) Navigation in the menues (b) Character input (c) Understanding of the full range of keyboard functionalities (d) Working with the different types of questions. Results of the evaluation have been implemented. The presented screenshots show the optimised user interface design.

Conclusion

The potential of iTV for education includes high user engagement via learning dialogues. The developed learning dialogue includes different question types and is content independent. It can be integrated and reused in various educational iTV applications. Further research is needed regarding educational evaluation to examine if and in what way educational iTV applications in general and the developed learning dialogue in particular support the individual learning experience of the user.

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