T-learning Approach: Enhancing Video with Active Elements

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Abstract. T-learning courses are an effective way of education, but their creation is a time-consuming and expensive activity. We explain the process of t-learning courses development as it was proposed in the scope of the ELU Project. We suggest applying the combination of hyper-text on the basis of an electronic programme guide for navigation in the t-course structure and a video with active elements inside the particular lessons. The active elements of different types can also accompany classic TV broadcasting, without the ambition to achieve any predefined educational goals, but with the aim to make TV viewers more active and provide them with additional context-relevant information.

Keywords: t-learning, t-course, interactive digital television, user interaction

1 Introduction

Television (TV) is a familiar and accessible device for around 95% European households. Most TV broadcasters have long experience with educational programmes and numerous papers and analyses of effectiveness of TV based instruction were published [5], [6]. Throughout TV history, there have been attempts to add interactivity to educational television, but most experiments were short-lived, because the technology was too costly for average consumers. According to Jensen [4], after the big ambitious experiments with interactive TV systems in the mid-90s which aimed at the full spectrum of interactive services and very advanced kinds of interactivity, the tendency around the turn of and in the beginning of this millennium has moved towards downscaling and low technologically-based experiments with interactive TV. A new more realistic strategy develops simple services based on existing technologies and only concentrates on more advanced solutions in connection with the innovations of infrastructure, which will take place anyway.

The upcoming switchover, within which digital terrestrial broadcasting is planned to replace analogue broadcasting in EU, implying the introduction of MHP-enabled set-top-boxes will substantially increase the potential to bring interactive educational public services into most of EU homes. Nevertheless, the majority of set-top boxes nowadays available on the market is not equipped with the return channel or is equipped with standard modem. If the return channel is not available, local

interactivity is supported by the set-top-box (with data transferred via broadcast channel) and the proper pedagogical approach can help to minimize the technological limitations. The pedagogical approach will thus be influenced not only by the target group and by the topic to be learnt but also by the level of available interactivity, which should optimally provide the viewers with the opportunity to interact with the content, typically by answering quizzes, participating in opinion polls, voting for the best song etc.

As mentioned above, the range of possibilities is limited by the technology, mainly the unavailability of:

a) A broad return channel that is essential for the sending of user's response,
b) The hard drives in set-top-boxes for enabling optional storage of the digital content for later re-viewing.

The important advantage of the digital TV is that hundreds or thousands of programmes can be offered in parallel, which means that personalized applications can be offered to precisely defined user groups. With respect to education, this means that it is possible to customize the delivered educational content according to the needs of the learners of different age, learning styles, level of formal education or personal interests. The most promising educational service delivered via current iDTV seems to be non-formal or informal lifelong learning.

The project ELU [2] is focused on the development of t-learning methodologies, the development of a technological framework, together with demonstrators and prototype versions of t-learning courses. In this contribution, we propose two ways of enhancing video stream with elements of interactivity – one is suggested as a pure t-learning course building approach, the other one can increase the attractiveness of current TV programs without focusing on any particular educational objectives.

2 T-course in the cube

A *t-course* is understood as a set of learning units delivered by digital television broadcasting. For each learning unit certain educational objectives are defined and to achieve them suitable educational methods are used. Each learning unit is composed of sequences of learning events (*elements).* With respect to the level of the student's involvement in the learning process, these elements are either passive or active.

Active elements make the user interact, usually by answering questions or playing games, and can be operated by using buttons on the remote control. Optionally, the user's success in activities can be compared with the results of other TV viewers. During watching the instruction, the active elements work as a source of feedback or motivation for the viewer: the correct answers assure the viewer that he/she has understood the explanations well, while the open questions or humorous statements simply attract the viewer's attention. At the end of instruction, the multi-player competitive game is supposed to be used. The game is derived from the well-known models of TV shows such as *Want to be a millionaire*. The game statistics can be gathered and maintained. The aggregated data can be presented to all viewers – e.g. *the hall of fame* of the most successful players.

Technically, for navigation in the t-course structure, the hypertext document is applicable. The document can be available from the Electronic Programme Guide (EPG). At the introductory page of the t-course, the learner chooses the lesson.

3 Transforming the available videos into t-courses

In comparison with other educational media, the development of t-courses is certainly an extremely time- and cost-consuming process where numerous specialists are needed. Therefore, to minimize the costs, it is meaningful to reuse as much as possible of the television content that is already available. Here it means to reuse documentary films and video sequences from TV archives. For the given educational objectives of the current course, the relevant videos can be identified and the t-course can be built on them. (Digital libraries of multimedia objects equipped with metadata records are great help.)

Typically, the documents about the nature or geography can be transformed in t-courses simply by introducing active elements. It is necessary to extract short instructional sequences, define active elements that correspond to these sequences and then merge the active elements with the videos. The main advantage of this approach is that it allows creating different customized t-courses based on the same video - for example shorter, easier t-courses for elementary school children and advanced t-courses for university students, or different language versions of the same t-course. The limitation of the proposed approach is in the accessibility of suitable videos. In this context, the BBC initiative called Creative Archive is interesting. The aim of this initiative is to provide access to public service audio and video archives in such a way as to allow the British public to find, share, watch, listen and re-use the archives for their own creative endeavors [1].

Numerous good video programmes and movies have already been created for general domains such as wild animals' habits, gardening, sightseeing in world cities etc. But the more specific themes such as higher mathematics or minor languages and dialects have still not been covered by educational films and documents. Moreover, certain problem domains (medicine, social affairs or computer technology) evolve so quickly that one- or two-years old films are totally out-of-date.

4 Structure of active elements

As we explained, there are two reasons why to involve active elements in t-courses: providing feedback to the learner and increasing the motivation of learners. The usage of remote control instead of keyboard or position devices such as the mouse asks for deeper analysis of the users' typical behavior. It is necessary to learn about the existing constraints that limit the design of the interface of t-learning application (such as the size of fonts, layout of elements on the screen, the preferably used buttons on remote control etc.). Here the experiences with user interfaces design are important. The t-learning methodology of ELU project will cover these issues, too.

The general structure of an active element is as follows. The total timing of the element is composed of:

c) Time limit for asking the question,
d) Time limit for answering,
e) Time limit for evaluation of the user's response.

Three different situations have to be managed – either the user answered correctly, or he/she was wrong, or he/she missed the limit because of different reasons. For all these situations, suitable explanations have to be predefined (either to comment the correct answer, or to explain the wrong choice, or to stimulate a non-active learner).

There are several suitable formats of questions:

a) Hits – the question is displayed together with three or four possible answers, where only one answer is correct,
b) Statements – the user has to make a decision about the true value of a given sentence,
c) Pairs – the user is asked to complete pairs of items in two lists (e.g. related terms, questions and answers, etc.),
d) Step-by-step – the objective is to organize the given steps into the applicable scenario that solves a given task.

All four types of questions can be answered using arrow keys and OK button, or using numbers 1-4 on the remote control. Naturally, the manipulation with items in "Pairs" and "Step-by-step" tasks is difficult. Here the users will need some training, because they should not be stressed by troubles with managing answers by the remote control. We suggest defining standard ways of manipulating the frequently used types of questions and reusing the same patterns in all t-courses. ELU project methodology will provide such recommendations.

The final game (at the end of the lesson or the whole t-course) can operate with the same types of questions, but its visual design should be more attractive. The game session can be organized by a virtual animated speaker (guidebot) who converses with the viewer, gives him the questions and reacts to the answers.

5 Accompanying non-educational TV stream with active elements

In addition to special t-courses, we consider accompanying the traditional TV formats with active elements that can make viewers more active. Using the digital broadcasting technology, it is possible to provide the stream of active elements in parallel with the video stream. If the video stream content was tagged (equipped with metadata), it is possible to automate the extraction and delivery of the relevant active elements (not only the questions, but also the text-based or image-based extra information sheets). Users can access these elements in the same way as they access teletext, it means they can switch to the active element and work with it while listening to the sound of the video stream on the background. This technique can be applied e.g. on TV news where viewers can access the additional context information, such as maps, tables, statistics, definitions of terms, Guinness book's facts etc.). The same principle is applicable in commercials, too.

6 The pedagogy for independent adult t-learner

From the variety of information about iDTV deployment presented in [6] we can conclude that iDTV can be seen as a perspective tool for non-formal and informal lifelong learning. We can also conclude that independent learners are the most successful learning-type of learners in TV courses. For independent adult learners who do not expect competitive environment, the Gagné's nine steps of instruction can be successfully modified for the use in the iDTV environment. Gagné [3] identified the mental conditions for learning which are based on the information processing model of the mental events that occur when adults are presented with various stimuli. The detailed guidelines how to use this approach in t-learning are given in [7]. In the the next stage of project, this approach will be tested and evaluated for the target group „adults", as analysed and described in [7].

The content creators will use the instructional elements developed within the ELU project to support the development process. The most important instructional elements comprise the game templates and the virtual teacher. Games are the proper elements to enhance the learners' activities and especially the game-based assessment can contribute to the intrinsic reinforcement and to the enhancement of the knowledge retention. If the return channel is available, games can be used to support the extrinsic rewards to the learner's successes. Game templates created within ELU are e.g. the couple game, the put-it-in-the right-place game, the puzzle game and the visual quiz. Games can be used in situations when local interactivity only is available. As reported, for instance in [8], set-top-box based interactivity appears to promote competition and involvement with the video content to a greater extent than mobile phone based interactivity does.

The virtual teacher guides the learner throughout the course and can have many visual representations. Its main purpose is to provide a communication bridge between the learners and the t-Learning applications and therefore must be able to reflect similarly as a real teacher.

7 Conclusion

In the paper we have described the process of t-learning course development. The proposed approach is explored in the scope of ELU project. An intensive research is focused on defining the precise guidelines for the development of t-courses. The guidelines give recommendations for the lengths of instructional sequences, the possible formats of interactive elements, the way of communications with tutors and with other learners, the involving elements of edutainment etc.

For the prototype t-courses implemented in the scope of the ELU project, several target user groups have been defined (from elementary-school children through adults to the elderly) and according to their educational needs, relevant themes of six t-courses were selected. The content of the t-courses is under construction and in parallel, technical solution is being developed that will enable to merge video sequences with MHP applications and run the t-courses on TV with remote control.

Acknowledgments. This contribution was supported by the Enhanced Learning Unlimited (ELU) project funded by the European Union under the 6th Framework Programme (Contract No. IST-4-027866).

References

1. Creative Archive Licence Group http://creativearchive.bbc.co.uk
2. ELU project website. http://www.elu-project.com
3. Gagné, R. M., Wager, W. W., Golas, K. C., & Keller, J. M. : Principles of Instructional Design: Thomson Wadsworth (2005)
4. Jensen, J. F. Interactive Television: New Genres, New Format, New Content. Proceedings of the Second Australasian Conference on Interactive Entertainment, Sydney (2005)
5. Moeller, B. (1996). Learning from Television: A Research Review. http://www.media.mit.edu/explain/papers/10_1996b.pdf
6. ORT France (eds.) Project ELU Deliverable D 2.3. - State of the Art on Learning Using iDTV (2007) http://www.elu-project.com
7. ORT France (eds.) Project ELU Deliverable D 2.2. – Instructional methodologies(pedagogy) for t-learning (2007) http://www.elu-project.com
8. Strandwall T., Sperring S.: "Different"and "Exciting" – the Impact of Set-top-box and Mobile Phone Interactivity on the TV viewing Experiences, Interactive TV: A Shared Experience, TICSP Adjunct Proceedings of EuroITV, Amsterdam (2007)