ABSTRACT

The present interactive multimedia courseware is predominantly monolingual. On the other hand, economy, society and education are global and multilingual. Therefore, it seems reasonable to expect that multilingualism should bring benefits to the education process. This paper defines the aspects of multilingual interactive multimedia courseware composition and advocates for the support of multilingualism in the learning process. Example user interface evaluation of the monolingual courseware proposed by Reeves and Harmon and their potential use in the multilingual courseware evaluation are also given.

1. INTRODUCTION

Globalization is one of the main challenges of the future education. If economy, society and education are global, then multilinguality represents one of the most important aspects that remain to be addressed more thoroughly. The aim of this paper is therefore to explore the concept of multilinguality in educational tools for selected areas of Human Language Technologies [1,4,6,13].

It is shown that the development of multilingual courseware could be modeled as a mapping of study goals in the context of particular languages that require domain driven translations of teaching materials. In particular, to achieve similar educational goals in different languages/cultures requires detailed domain knowledge and translation of concepts rather than mere translation between the languages. Additionally, multilingual user might benefit from his/her proficiency in several languages which calls for courseware support of multilingualism.

The following section of the paper presents some basic definitions. Section 3 then focuses on the important issue of multilingual courseware user interface evaluation. Section 3.2 presents an illustrative example of monolingual courseware user interface evaluation by using monolingual tool which has been recently presented in the frame-work of the Thematic Network Speech Communication Sciences [2]. Finally, conclusions are presented in the Section 4.

2. DEFINITIONS

Multilinguality is defined as the psychological state of an individual who has access to more than one linguistic code as a means of communication [12].

Multilingualism is the state of a linguistic community in which a number of languages are in contact with the result that different codes can be used to perform the same interaction [12].

Courseware is defined as a subset of learning technology that covers all educational multimedia including technologies that support or enhance the learning process. The courseware is typically tied to educational methodologies such as computer aided learning (CAL) or computer-based training (CBT) [7,10,11].

Human language technology (HLT) represents hardware, software and resources that enable processing of spoken and written natural languages including multimodal interpersonal communication [4]. HLTs enable faster or more efficient way of dissemination of information in a decentralized way that better serves the needs of the multilingual information society.

Since the courseware is typically targeted to be used in global educational arena it is necessary to possess multilingualism that allows achievement of study goals in several languages.

2.1 Courseware Composition

The goal is to design a multilingual multipurpose multimedia courseware which allows for the conceptual design of various study goals for different users/languages/cultures exploiting the same teaching materials.

Following [12], we introduce a Unit of Learning Material (ULM) that consists of two parts

1. the objective data (e.g., in audio, graphics, video formats), and
2. the educational function.

The educational function serves a particular style of teaching and represents the subjective description of the data. The separation of data from its educational function aims towards usability of the same teaching material for different teaching purposes. As in [12], the objective data is called a multimedia sequence (MS) and its educational function an Envelope.

In principle, the ULM could be tailored by a human or machine. The former case implies the use of authoring tools by a human developer whereas the latter typically means an implementation of a system e.g., such as the development of an intelligent tutoring system.

Furthermore, in order to achieve higher level teaching objectives than those possible with the particular ULM, ULMs could be put together to form a learning sequence (LS).

Figure 1. summarizes the above definitions and the formal courseware definition can be given as:

Courseware → { LS }* + Envelope
LS → { ULM }* + Envelope
ULM → [ Program | MS ] + Envelope
MS → data, text, images, animation, audio, video
Envelope → Intention + Facility
Facility → Authorware, Programming language

Figure 1. Formal definition of the courseware.

2.1 Multilingual Courseware Composition

In general computers as tools should help to solve problems interactively. Yet in many occasions the hardware and software components assume that the users are native speakers of English. Despite cosmetic patches such as dedicated keyboards, or translated set of words/commands from English to the target language, the underlying semantic structure of the system remains unchanged. This could potentially confuse non-English users since the conceptual structure of a tool might not necessarily automatically map in the process of lexical translation to that of the target language. The interface derived in such a way could result in suboptimal human-machine interaction.

What is clearly needed is that the language becomes a true attribute of the system. The multilingual courseware should therefore at least

- include the language/culture specific LS and Envelopes,
- support the multilinguality by judicious composition of the MS,
- support the multilingualism.

The first two requirements are obvious. For example, in order to easily and efficiently tailor the courseware to the target language the MS should use simple graphic icons, exclude text in graphics to simplify the translation, and avoid cultural biases such as slang or euphemism [3].

In the case of user multilinguality, the system should enable specification of a list of languages that are mastered by the user. This would potentially enable him/her to benefit from explanations in different languages, since combination of instruction in several languages of preference could present a different view to the ULM under study.

Additionally, exploiting the user multilinguality would call for multilingualism in the help menu design. After specification of the users’ language proficiencies, the courseware may generate a multilingual help on the fly and offer it to him/her whenever necessary.

The support of multilingualism should of course be a matter of choice. In principle, the multilingual courseware should support both monolingual and multilingual users, and encourage the knowledge acquisition in more than one languages in the latter case.

3. USER INTERFACE RATING FORM

Multimedia courseware can be considered as an efficient complement to the traditional ways of teaching. Interactivity of the courseware can balance between the teacher guided and open ended learning environments. It can potentially create and stimulate the learners’ motivation and interest. Therefore, it is important that the interactive multimedia courseware offers an efficient user interface. Its capabilities and effectiveness can be judged in a number of ways and should be evaluated in a consistent way.

Reeves and Harmon [9] proposed a scheme that enable us to rate the quality of the user interface by using up to ten User Interface Dimensions (UID).

3.1 Multilingual Courseware Appraisal

Reeves and Harmon [9] proposed the followingUIDs for rating the monolingual user interfaces:

1. UID: Ease of Use
The courseware reviewer must judge how user would interact with the courseware. The assessment is ranges from Difficult to Easy.

2. **UID: Navigation**

The reviewer has to judge whether the navigation allows the user to move through the courseware, and that the user knows how to get to another part of the courseware. The assessment is scale is from Difficult to Easy.

3. **UID: Cognitive Load**

Use of interactive multimedia courseware requires different mental efforts than learning via print or other media. A user must understand i) the content of the program ii) its structure and iii) the response options available. Users have to perceive an option, conceptualize a choice, and then make some physical action, all while mentally coordinating the demands of these three cognitive loads. The assessment scale is from Unmanageable to Manageable.

4. **UID: Mapping**

The reviewer has to judge how well the user will know how much of the courseware he/she has visited and how much is left to visit. This means that in order to avoid the user disorientation in complex non-linear multimedia programs the user has to know the boundaries of the information space. It is also important to show the sufficient yet not too detailed user path through the program. Interactive programs are judged on a scale from None to Powerful.

5. **UID: Screen Design**

The reviewer has to be satisfied that the screen is pleasing to use. This does not mean that this UID deals with artistic dimensions of interactive programs which are separately considered by the 9th user interface dimension defined below. Text, icons, graphics, colours, and other visual aspects of interactive programs are judged and this judgement is of course very subjective. The assessment is made from Violates Principles to Follows Principles of screen design.

6. **UID: Knowledge Space Compatibility**

The reviewer has to try and ascertain that information presented is suitable for the user's current understanding of the subject. The novice users frequently possess an inadequate knowledge space with respect to the content of a program due to ignorance, misconceptions, or both. If any searches take place, users have to be pleased when the resulting information is compatible with their current knowledge space. In case information received is not perceived as relevant to the users’ search strategies, the system could be perceived as incompatible. The assessment scale ranges from Incompatible to Compatible.

7. **UID: Information Presentation**

The reviewer has to evaluate whether the information is presented in an understandable form. We must differentiate between providing an information and users’ ability to comprehend, understand, and learn from the information presented. Information presentation is defined as a dimension ranging from Obtuse to Clear.

8. **UID: Media Integration**

One of the most important aspects for success of multimedia applications is how various media are combined to enable an efficient man machine communication. If different media are used the reviewer has to judge whether they are well combined in the courseware and have not been used gratuitously. The assessment scale ranges from Uncoordinated to Coordinated.

9. **UID: Aesthetics**

In judging this user interface dimension the reviewer has to decide how the courseware looks and feels overall. This is clearly very subjective. The assessment scale is from Displeasing to Pleasing.

10. **UID: Overall Functionality**

The reviewer has to judge how useful the courseware is to the intended user. It is important that functionality is assessed according to the specific intended use that exist in mind of the users. The assessment scale is from Dysfunctional to Functional.

Ten UIDs can also be depicted graphically.

In addition to the User Interface Dimensions there exist Pedagogical Dimensions of interactive multimedia courseware. The User Interface Dimensions are concerned with those aspects of the courseware that ensure the learner can actually engage in a meaningful interactivity with a program. Pedagogical Dimensions, however, are those aspects of the courseware design that directly affect learning. They include dimensions such as Epistemology, Pedagogical Philosophy, Underlying Psychology, Goal Orientation, Instructional Sequencing, Experiential Validity, Role of Instructor, Value of Errors, Motivation, Structure, Accommodation of Individual Differences, Learner Control, User Activity, and Cooperative Learning. Their detailed description is beyond of the current scope of the paper and will...
be elaborated in the multilingual aspect at a later date.

Original courseware appraisal proposal [9] is general enough that the UIDs successfully absorb the case of the multilingual courseware. Since language becomes true attribute of the multilingual system it affects all ten UIDs and there is no need for the explicit dimension related to multilinguality.

3.2 Example Courseware User Interface Evaluation

The courseware chosen for evaluation is the tutorial on Models of Speech Perception (v 1.01, 1999) by Cutugno and Fougeron which was presented in the framework of the Thematic Network Speech Communication Sciences. It consists of three parts and presents five major speech perception models including background information, definitions and list of references [5].

1. Ease of Use
2. Navigation
3. Cognitive Load
4. Mapping
5. Screen Design
6. Knowledge Space Compatibility
7. Information Presentation
8. Media Integration
9. Aesthetics
10. Overall Functionality

Figure 2. User interface rating form of the tutorial Models of Speech Perception [5,9].

Figure 2 shows that the courseware’s strong dimensions are Ease of Use, Information Presentation and Overall Functionality. The weakest point seems to be the Mapping dimension, since once the user enters “course cards” [5] the visual information of user’s track through the program is lost.

4. CONCLUSIONS

Interactive multimedia courseware should be multilingual and support multilingualism for the sake of efficient learning. This means that throughout the lifecycle designers should follow up discussed and other basic principles of multilinguality, e.g., during the phase of its original conception as well as through the production and maintenance. Principles and definitions of the multilingual courseware have been reviewed and discussed from the point of view of multilinguality. Example of the monolingual courseware user interface has also been evaluated and discussed.

5. REFERENCES