

ADAPTIVE E-LEARNING SYSTEM FOR TEACHING FOREIGN LANGUAGES

Salamat Khatamova*
Oybek Hotamov**

* Teacher, Gulistan State University (Republic of Uzbekistan)

** Researcher, Gulistan (Republic of Uzbekistan)

Abstract: The article presents a proposal, design and implementation of a new approach to adaptive e-learning systems. First, a proposal of a model is presented. This model aims at introducing adaptivity to current e-learning systems, which are rigid and limited in offering a truly personalised learning to individual students. Many of current e-learning systems enable personalised learning. However, in this paper, there is a new, innovative approach proposed for an adaptive personalised e-learning system. The primary area of our research is second language acquisition (SLA). Adaptivity in our view is considered as an ability of the system to adapt to student's knowledge and characteristics. This pedagogical perspective requires introduction of such processes that enable to work the pedagogical aspects of teaching/learning. The required processes are of informatics nature. The proposed model was subsequently designed into a real application. Finally, the application was implemented and verified on a real data set. The results are also provided.

Keywords: distance learning; e-learning; foreign language teaching.

I. INTRODUCTION

E-learning users have already got used to take the advantage of computer-based education, primarily if it concerns foreign languages (Bos & van de Plassche, 1994). Language education using e-learning systems is currently very popular, this way of learning is described in detail in Andrews and Haythornthwaite (2007). Thanks to huge expansion of social networks, language education is also possible online using such networks. Language education through social networks is described in Lin, Warschauer, and Blake (2016). One of possible approaches to online testing is described in El-Hmoudova, Milkova, and Garant (2012).

As it was proved by Rudak et al. (2012), languages can be taught and learnt using an e-learning form, although there exist certain limitations. The results are subsequently also quite “limited” and as Murphy and McTear (1997) point out, e-learning of foreign languages lags behind providing a flexible feedback and personalised approach. Currently, there is a number of intelligent techniques for personalisation in e-learning systems (Klasnja-Milicevic, Vesin, Ivanovic, Budimac, & Jain, 2016). There are also various strategies for creating and implementations of intelligent tutoring e-learning systems, which are closely described in book by Woolf (2010).

II. ITS & LMS

Although this idea appeared thirty years ago, the computer-based education, primarily in the form of Intelligent Tutoring Systems (ITS) have not achieved its full potential yet (Ferster, 2014). Over the time, this resulted in the development of various systems (mostly as an LMS – Learning Management System) which would remove such negatives. Primarily, it concerns the English language as a recognised communication, publication and scientific language all over the world. English has already become a so-called lingua franca. Research in this field can be categorised into the areas of its research and methodology focus:

- adjusting of existing LMSs with so far unused pedagogical approaches;
- change of existing LMSs from the technical point of view, thus enabling to implement necessary functionalities to introduce new, so far impossible processes;
- adaptivity.

III. RESULTS

Currently, there are several approaches to optimise and make foreign language education through e-learning more effective. Such approaches will be mentioned in the text below. The first one is optimization of foreign language education in relation to learning styles. The objective of such an approach is to detect perception preferences of a student according to the VARK methodology and a subsequent offer of a suitable modification of the course according to the detected preferences.

The main motivation of our work was to propose a new approach for the creation of an adaptive e-learning system for language education. The main aspects of the proposed approach are as follows:

- Detection of student's sensory preferences (not a learning style), which enables to create an idea of a suitable form of the learning content for the given student (for more details see Bradac, 2013);
- Use of an expert system to test student's level of knowledge in order to find out the need to study.

The proposed model takes ground from the model of decision-making in Klimes (2011). The proposed model includes the following basic steps (processes), which will be further described in the following subchapters:

- Acquisition of information about student – student's data on areas concerned in the decision-making;
- M1a - acquisition of information about student's sensory ability.

One of the most often cited benefits associated with ICT is its ability to increase flexibility and learner control over time, pace and modalities of material access (e.g., Curtis, Duchastel, & Radic, 1999; Egbert & Jessup, 1996; Oxford, Rivera-Castillo, Feyten, & Nutta., 1998; Pusack & Otto, 1997). Because of this, ICT seems particularly apt to ensure correspondence of instruction to individual learners' styles and needs, therefore promoting positive attitudes and sustaining motivation (Duchastel, 1997; Garrett, 1987, 1988; Harben, 1999; Pennington, 1996; Reeves & Reeves, 1997).

In fact, apart from different skill levels and interests, ICT can also cater for a multiplicity of learners' preferences in terms of perceptual mode, due to its multimedia nature (Soo, 1999; Underwood, 1988). A great advantage attributed to multimedia materials over traditional presentation media is their ability to integrate a variety of input sources in a coherent and cohesive way: The strength of multimedia software is in the synergy derived from presenting content using a variety of modalities that can reinforce each other and that are linked together in meaningful ways to provide an in-depth learning experience. (Pusack & Otto, 1997, p. 2) Indeed, the above observations should be extended to include what is normally referred to as hypermedia, which integrates the concept of hypertext with that of multimedia, as is the case with most instructional materials delivered via ICT.

Hypertexts allow task designers to store additional information, such as dictionaries or other reference materials, that learners can access if and when needed, to enhance their comprehension. The fact that such materials are available through a simple mouse click, but remain hidden until they are requested, ensures a high degree of correspondence between the amount of assistance provided and the reader's skill level. Furthermore, large amounts of information can be made available without becoming distracting or intimidating for the learner (Davis & Lyman-Hager, 1997; Ellis, 1995; Greaves & Yang, 1999).

According to some scholars (e.g., Richmond, 1999; Stevens, 1992), not only can online reference materials be more time efficient than their written counterparts, but their use entails a more effective use of cognitive resources. For example, the definition of an unknown word, requested during a task, would appear on the screen next to the context in which that particular word is used, freeing up cognitive resources that could otherwise be employed to retain information gathered from other sources (see also Ellis, 1995).

Other cognitive advantages have been associated with intrinsic features of hypertexts. Jonassen and colleagues (Jonassen, Dyer, Peters, Robinson, Harvey, King, & Loughner, 1997; Jonassen, Duffy, & Lowyck, 1993), for example, have suggested that the exploratory, non-linear nature of hypertexts and their ability to represent multiple perspectives, coupled with the opportunities for engagement in collaborative, problem-solving tasks they provide, would promote learners' cognitive flexibility (see also Gruba & Lynch, 1997; Spiro, Feltovich, Jacobson, & Coulson, 1995). Other researchers have noted that hypertexts facilitate a deeper approach to learning materials, in that they require learners to select, interpret, and reorganise chunks of information into a coherent and cohesive mental image, which involves reconstruction, rather than reproduction of knowledge (Gordon, 1996; see also Lanzotti, 1997). Finally, the associative structure of hypertexts has been likened to the organisation of knowledge within the human mind (Ebersole, 1997; Oliver, Herrington, & Omari, 1996). Because of such similarity, retention and retrieval of information acquired through hypertexts would be facilitated.

The hypermedia nature of ICT, therefore, ensures that individualised sequences of access to a range of materials can be easily built while maintaining coherence and cohesiveness in the presentation and, indeed, providing cognitive advantages over traditional media. From this point of view, ICT can represent an important step towards the establishment of environments that allow high levels of flexibility and learner control. Increasing learner control, however, presupposes a reasonable degree of autonomy in students, who must possess the necessary knowledge and skills to make informed choices (see Blin, 1999; Goodfellow, 1999, for further discussion). As has been previously noted, adult distance learners often have lost or never acquired these skills, and may not be able to implement strategies (either metacognitive or linguistic) to manage their learning effectively. The role of the instructor in providing scaffolding and coaching, therefore, remains fundamental to sustain and enhance learners' ability to engage in autonomous learning, particularly in technology-rich environments. This is where the communication tools offered by ICT become invaluable assets.

It can be claimed that our proposed model of an adaptive e-learning system is generally usable for personalisation and adaptation of the educational process of any language course, i.e. in the area which was experimentally verified. However, it does not disqualify it in other areas which have not been verified yet. The proposed model features a high probability of usage in any course regardless the studied area.

IV. CONCLUSION

The paper presented a proposal of a new approach to adaptive e-learning systems. The approach is based on several methods and it is divided into several processes. First, the authors focused on the division of the studied subject into categories which are assigned with different importance. Then, an initial didactic test was created where the

questions were related with the categories from the previous step. The initial didactic test is assessed by an expert system based on input values.

While the results obtained in our preliminary evaluations are encouraging, a number of questions remain open. Firstly, the small number of students involved in the piloting phase, coupled with the fact that no formal evaluations were conducted, do not allow us to draw conclusions as to the impact of the instructional materials we designed on learners' attitudes and motivation. Further studies need to be conducted on a larger scale, employing rigorous methods of data collection and analysis. Furthermore, the full implementation of our original design, which includes both the CD-ROM and the WebCT component, will introduce modifications that can be expected to influence learners' attitudes towards the course. In particular, as the new environment will be more reliant on ICT, and opportunities for direct contact with the instructors will be somewhat reduced, it will be necessary to monitor the students' reaction to these important changes.

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Reviewer:

Basri Rashid

PhD, The University of Nottingham

AUTHOR(S)

Author – Salamat Khatamova – Teacher, Department of the English Language and Literature, Faculty of Philology, Gulistan State University (Republic of Uzbekistan)
 – Oybek Hotamov – Researcher, Gulistan (Republic of Uzbekistan)