

Implantation and evaluation of ICT Resources oriented to self-learning and self-assessment

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Abstract:

E-learning contents are, generally, complete, well designed and correct, but they may sometimes become boring for students. In this contribution, we propose the use of three different ICT resources, complementary to each other, aimed to student's self-training and self-assessment: Exam Resolution via Web, Educational Games and Exam Resolution via Mobile Devices. The resources have been successfully implanted and evaluated by students of the University of Jaén.

1 Introduction

The last years have been witness of the huge development of the Information and Communication Technologies (ICT) due to the growth of the Internet and its services [1,3]. A deeply affected area has been *learning*, because the Internet has allowed overcoming both time and placing limitations with the concept of *e-Learning*. The idea of using virtual learning environments (VLE) to store educational contents is common in most educational institutions nowadays, using contents that support student's self-assessment and self-training processes. A key issue in self-assessment and, in general, in self-learning is the set of learning resources that teachers make available to their students [3]. The only use of simple multiple-choice tests may finally result boring for students, causing that they withdraw their use in a long term, so it seems appropriate to develop entertaining tools to complement these tests. In this contribution, we describe the implantation of three complementary ICT resources, destined to student's self-training and self-assessment processes: (i) Exam Resolution via Web (ERW), (ii) Educational Games (EGs) and (iii) Exam Resolution via Mobile Devices (ERMD). This contribution is structured as follows: Section 2 reviews some concepts of e-learning and m-learning. Section 3 shows our three complementary resources. Section 4 presents a comparative study of the above mentioned resources. Section 5 shows the implantation and evaluation results on the subject *Computer Architecture and Engineering*. Finally, Section 6 presents some conclusions and future work related to our proposal.

2 E-Learning and m-learning Resources

Until relatively few years ago, one of the main drawbacks for most students was the non-immediate availability of the required learning resources to perform self-learning processes, due to limited number of computers connected to the Internet. However, in the last years this limitation has been reducing remarkably. The incorporation of ICT in the Internet has meant the new educational methodology of the 21st century [1,2]: the *e-Learning*¹.

¹ e-Learning. <http://www.elearningeuropa.info/>

E-Learning can be defined as *the convergence of the internet and education* [2] and *All possible ways of learning by means of the Internet*. (Cisco Systems²). In a parallel way to e-Learning, the concept of Content Management has become important. Systems that support Content Management offer a Web platform to manage and disseminate educational contents [5]. A clear example can be found in VLEs such as Moodle³. The access and use of e-Learning contents through VLEs means a strategic resource to increase the competitiveness, efficacy and efficiency in teaching quality and self-learning. Many current VLEs have adopted some agreements in content standardization, for example SCORM modules, which may contain a great variety of contents and interactive applications developed under multiple technologies.

As we have just seen, the peak of Internet, ICTs and, consequently, e-Learning methodologies, make a non-attending self-learning process possible. However, it is still necessary for the student to have available a computer connected to the Internet whenever he wants to access those learning resources he is interested in, so it is desirable to provide him a way of accessing the above mentioned contents anywhere and anytime. This way, recently appeared the concept of *m-Learning*, as a new mean to develop learning resources adapted to mobile devices, taking advantage of the wireless connectivity and the existing e-learning contents adaptation to this new paradigm [6].

Nowadays it is interesting to consider the adaptation of existing Internet educational resources for students to mobile devices, so that students have the possibility of accessing contents at anytime and practically anywhere, with the only requirement of taking with themselves their mobile device with the appropriate connectivity mechanism.

3 ICT Resources to perform self-assessment and self-training process

We present in this section the ICT-based resources developed to allow students to perform their self-learning processes [4] through objective questions.

Exam Resolution via Web (ERW) is perhaps currently the most spread resource to perform a self-assessment process. It consists of the carrying out of a series of test-type questions available in a Website. Once a student has answered the questions, he receives immediate feedback about his/her results. Figure 1.(a) shows an example of the use of this resource. We propose the combined use of different kinds of objective questions: true/false questions, multiple choice questions, filling gaps and definitions. The second resource presented here, **Educational Games** (EGs), is oriented to carry out a self-assessment task in a entertaining way, trying to achieve a balance between learning and entertainment. Figure 1(b) shows an example of the use of this resource. EGs are inspired by traditional puzzles: hang-man, crosswords, word find puzzle, etc, and they can be presented as Web applications and SCORM modules (appropriate for their integration in VLEs). The third learning proposal, **Exam Resolution via Mobile Devices** (ERMD), consists of an adaptation of the first resource, ERW (see Section 3.1), with the difference that now students only need their mobile device within their reach. ERMDs are independent on the mobile platform used, and can be downloaded by different ways: USB connection, Bluetooth, Wi-Fi access and so on. Figure 1(c) shows an example of the use of this resource.

² CISCO Systems: <http://www.cisco.com/web/MX/index.html>

³ Moodle: <http://moodle.org/>

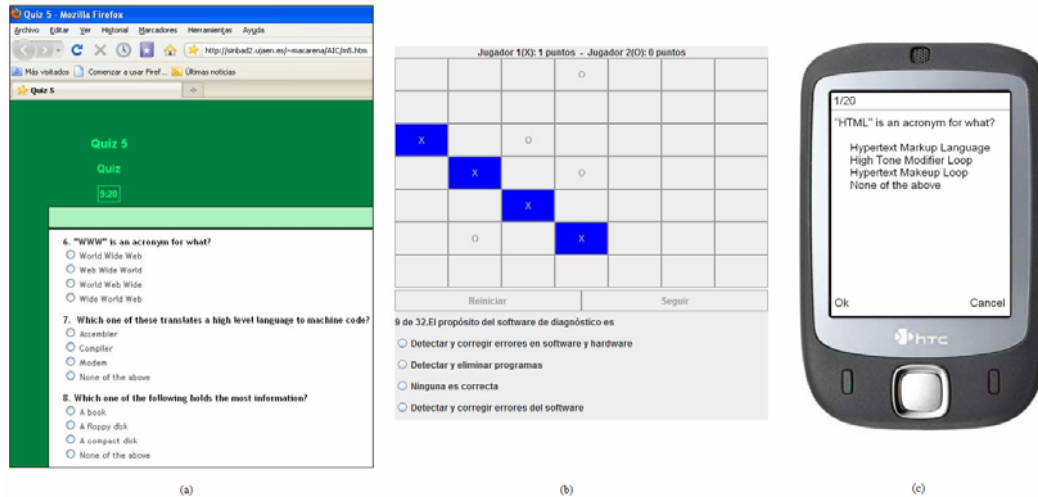


Figure 1 – Educational resources’ overview. (a) Exam Resolution via Web. (b) Educational Games. (c) Exam Resolution via Mobile Devices.

4 Comparative Study

| Issue | ERW | EGs | ERMD |
|--|------------------------------------|---|---------------|
| <i>Mobile learning</i> | No | No | Yes |
| <i>Screen/interface size</i> | Wide | Wide | Small |
| <i>Possibility to include multimedia resources</i> | Yes | Yes | No |
| <i>Incorporation to VLEs and e-learning environments</i> | Yes | Yes | No |
| <i>Student’s motivation</i> | Low | High | Medium |
| <i>Recommended time to use the resource continuously</i> | 1-2 hours | 1-2 hours | 15-30’ |
| <i>Technical requirements</i> | Computer connected to the Internet | Computer with/without Internet connection | Mobile device |

Table 1 – Comparative study of proposed learning resources

We include a comparative study of the three learning resources presented in Section 3. All resources aim to a self-learning process through a feedback mechanism with objective questions resolution, and the recommended use of each resource depends on several factors, which will determine which of them is the most suitable for the student, depending on his/her context at any time.

5 Implantation and Evaluation of Resources

In this section, we present the implantation and evaluation of the proposed ICT learning resources during the first semester of academic year 2009/2010, in the subject: *Computer Architecture and Engineering*. The subject is taught in the University of Jaén, in the fourth year of M.Sc. Degree in Computer Science. We had 35 students aged between 21 and 27, most of them male, with total dedication to their education. The resources introduced were evaluated by students by means of a voluntary survey.

The most relevant results drawn were the following: ERW was used when students got ready to self-train and self-assess for a long period, in order to prepare their final exam. Most students (73%) pointed out that EGs was the best alternative to ERW to self-assess their acquired knowledge and motivation to use ERW was not enough. In the beginning of semester, many students downloaded and installed the ERMD resource. Initially, they thought it wouldn't be a very used resource. However, as time went by, this has been the most employed one. The reason is that frequently came up situations where even if they hadn't previously planned to perform a self-training and self-assessment process with ERMD, they finally did it because they always had this resource within their reach. A considerable percentage of students (81%) believe that using these resources has supposed a key factor in the final mark obtained in the subject. From these results, we can state that offering different complementary resources suitable for different scenarios, students can devote more time to their self-training and self-assessment process. Thus, they can prepare themselves for the final exam more effectively.

6 Conclusions

We have presented three complementary ICT resources based on different kinds of objective questions, making it possible to self-assess in different scenarios, we have highlighted the main issues for each resource in a comparative study, and we have shown the results of implantation and evaluation on the subject *Computer Architecture and Engineering*.

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References

- [1] Browning, P., and Williams, J.: Using the internet in teaching and learning: A U.K. perspective. *Computers and Geosciences* (1997), 23 (5), pp. 549-557.
- [2] Ho, L.A., and Kuo, T.H: How can one amplify the effect of e-learning? An examination of high-tech employees' computer attitude and flow experience. *Computers in Human Behavior* (2010), 26, p. 23-31.
- [3] Martínez, L., Araque, F., and Salguero, A.: Complement Contents in Virtual Learning Environments with Interactive Conceptual Maps: An Experience in Management Degree. *IEEE multidisciplinary engineering education magazine*, vol. 2, no. 3, September (2007), p.13-17.
- [4] McNamara, G. & O'Hara, J. (2008). The Importance of the Concept of Self-Evaluation in the Changing Landscape of Education Policy. *Studies In Educational Evaluation*, 34 (3) 173-180.
- [5] Piccoli, G., R. Ahmad, and B. Ives: Web-based virtual learning environments: A research framework and a preliminary assessment of effectiveness in basic IT skills training. *Mis Quarterly*, 2001. 25(4): p. 401-426.
- [6] Upadhyay, N (2006): M-Learning: A new paradigm in education. *International Journal on Instructional Technology & Distance Learning*, 3 (2): pp.31-34.

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