Use of WebQuest to improve Operating Systems learning

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Abstract. The impact of the Internet on the Society also affects the learning at the University. Students not only use printed books and their own notes, but also the information available in the Net. WebQuests are learning tools that help the students use the Internet, but under the supervision of the professor, who have previously selected the most interesting sites to visit. An experience of using WebQuests with first year Computer Science students is shown, as well as the good results obtained, both in the increase of successful examinations and in the good attitude of the students when using WebQuests.

1 Introduction

WebQuests are defined as learning tools developed through Internet resources previously selected by the teacher [1]. After that selection, students may use those resources to find and analyze the specific information they contain in order to improve their skills in several topics. One important objective consists on helping the students to properly manage their time, without lose of time browsing the Internet. Therefore, at lower levels, the teachers should provide the students the addresses of all the websites needed to find the information, while at upper levels only basic sites should be provided and the students must look for complementary places.

WebQuests were first designed by Bernie Dodge [2] as composed of six main parts: introduction, homework, process, resources, evaluation and conclusions. The main part is the definition of the work the students must accomplish, and it must be defined in a way that it keep their interest in the work until the end of the learning stage.

Some authors have reported their experiences with WebQuests, as an approach to help the integration of the Spanish University System into the European Higher Education Area [3], or using interactive learning games [4], or developing WebQuests by cooperation among teachers [5].

This work pretends to improve Computer Science students' motivation and learning in one topic related to the Operating Systems, by orienting them toward a proper use of Internet resources as well as stimulating the work in groups under

the supervision of a tutor. In section 2, the particular methodology used and the WebQuest are described; section 3 shows the impact on the students and on the learning; finally, some conclusions and future work are mentioned.

2 Methodology

This work has been used in order to help students to improve the learning of *Deadlock and Process Synchronization*, one part of *Operating Systems*, a compulsory subject in the second semester of the Computer Science degree. At the beginning of the semester, the students were informed of the possibility of passing those contents by making a supervised homework following the rules described in the departmental website (see figure 1).

Fig. 1. Web site with the instructions to accomplish the WebQuest

As a WebQuest tries to help the students use the Internet to acquire knowledge by visiting web sites previously selected by the professor, the instructions include the following information:

- Introduction. A presentation of the problem of deadlock and the need of process synchronization.
- Objective of the work. In this case, the students should make groups of no more than four people, and develop a web site explaining with their own words the concept of deadlocks, how to detect and avoid them.

– An enumeration of the several parts the work should cover. In this very case, the website should include the following sections:
  1. Definition of deadlocks
  2. Conditions required for deadlocks to happen
  3. Graphic tools available to detect deadlocks
  4. Deadlock avoidance: the Banker's algorithm
  5. Deadlock prevention and recovery
  6. Solved exercises
– List of selected Internet resources that the students should visit in order to get proper information to do the work without useless waste of time.
– Information of the evaluation scheme, that involved not only the quality and clarity of the contents, but also the quality of the whole web site, being the writing especially important as it is a key ability for every engineer and scientist. In addition, all the groups should do an oral presentation of their work to the rest of the students.
– At the end of the process, the best works are shown as conclusions in order the other students can use them to improve their learning (figure 2).

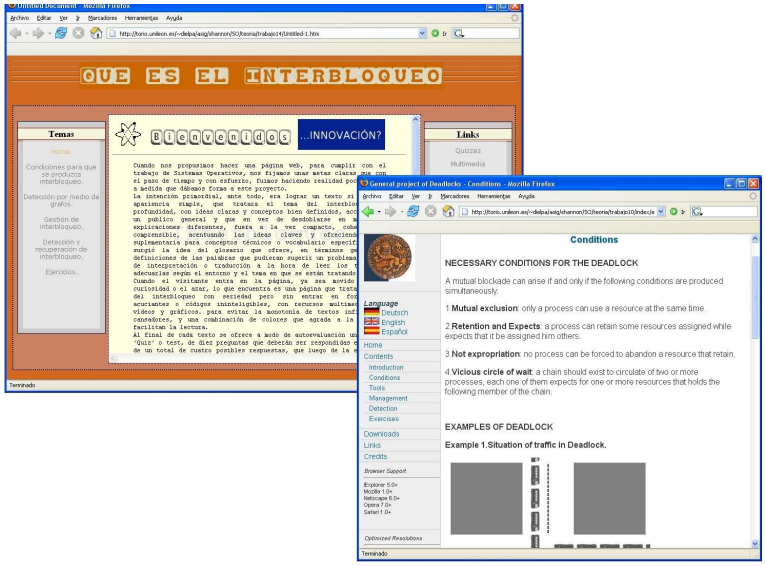

Fig. 2. Example of websites developed by the students

3 Experimental results

After the students finished their WebQuest, they gave their own opinions by means of an anonymous test after their final examination. The test asked the

students to give from 1 point (disagree) to 5 (agree) to the following assertions, but to the last one, which was to be answered just with yes or no:

1. The WebQuest helped me to learn *Deadlock and Process Synchronization*
2. The definition of the problem was clear enough
3. The work was very difficult to accomplish
4. The evaluation system was fair
5. I would recommend Webquests for other subjects/topics (if so, propose two subjects/topics)

As can be seen in table 1, most of the students confirmed that the experience had been quite positive, and even asked for a new WebQuest oriented toward helping them with the topic *Memory Organizations and Management*.

Table 1. Results of the test about the use of the WebQuest to learn *Deadlock and Process Synchronization*

	Degree of agreement (% votes)				
Assertion	1	2	3	4	5
1. Webquest useful	9.6	8.4	15.7	20.5	45.8
2. Clear definition of the problem	12.0	15.7	18.1	32.5	21.7
3. Difficult work	7.2	21.7	31.3	24.1	15.7
4. Fair Evaluation	14.5	12.0	18.1	36.1	19.3
		yes		no	
5. Recommend Webquests		86.7		13.3	

With respect to the incidence in the learning, we must say that before using the WebQuest, only 20% of the students passed the questions related to *Deadlock and Process Synchronization* , while after doing it, 33% succeed in the final examination, which means an increment of 65%.

4 Conclusions and future work

We can conclude that a WebQuest has been developed to improve the learning of *Deadlock and Process Synchronization*, a especially difficult topic inside Operating Systems. When the students develop the work involved in the WebQuest, not only Computer Science knowledge and abilities are acquired, but also additional ones, as working in groups, and technical writing and speaking, are trained. In addition, the students learn how to make simple web sites, as an advance for future subjects. Last, other students can learn using the websites developed by their own partners, as they all use the same kind of language, and they emphasize in those concepts they really find difficult.

The future work includes using WebQuests to help the students learn other topics related to Operating Systems (as suggested by our students, the next one will be dedicated to the learning of *Memory Organizations and Management*).

References

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