

Webquest and concept maps to learn about waves

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EXTENDED ABSTRACT

In Science Education, teachers are always looking for new and innovative teaching practices that allow students to engage in research activities. One of these new approaches takes advantage of the ubiquity of the Internet and use ICTs for teaching and learning.

Dodge (2001) designed the webquest as a strategy for inquiry-oriented teaching that allows students to interact with Internet resources; i.e. to construct meaning consulting a number of sources of information. The online resources the students visit are predefined by the webquest in order to avoid superficial searches or that the students are lost or unable to exploit the existing potential. Using the webquest, students analyze a set of knowledge, they transform it and demonstrate in-depth understanding of these concepts through a final product. According to Dodge, webquests improve time on-task, use information to solve problems and develop advanced thinking skills. Webquests include: an introduction, a task, a process, an evaluation and a conclusion.

In addition, the use of metacognitive tools such as concept maps for information processing favors meaningful learning because concept maps foster interaction between previous and new knowledge. (Novak & Gowin, 1985). Currently, the CmapTools software (Cañas et al., 2008) is also available, which facilitates the construction of individual or collaborative concept mapping.

In this paper we designed a webquest for students to investigate the uses and damages of waves.

METHODOLOGY

A webquest was designed as a complement to the presentation of the teaching point “waves” in the course of Physical Chemistry in a rural agro-technical school, located in Northwestern Patagonia, Argentina. Students come from rural areas and have had very few chances to engage in classwork online or use ICTs. To help them become familiar with the teaching topic, a flash animation on waves and their characteristics available online

http://concurso.cnice.mec.es/cnice2005/56_ondas/ondas.swf. This animation presents the concepts and allows the students to interact with waves, to make measurements of various parameters of the

waves and, finally, to solve exercises. After this activity, the students used the CmapTools software to make a concept map on the topic.

Then, they were asked to work on the webquest Waves: Uses and damages (<https://sites.google.com/site/webquestondas>). This task required that the students chose one of the following topics to investigate: 1) waves and health, 2) photography; 3) earthquakes; 4) tsunamis; 5) satellite images; 6) radio; 7) sound; 8) light, color and visual perception; 9) laser beams; 10) optical fibers 11) microwaves; 12) infrared radiation and 13) radars. For each of these topics, there were several Internet links that explained the concept, by means of animations, videos, sound or text. As a final product for the quest, students were asked to construct a concept map of the topic they chose and present it to their peers. During two classes, the learners carried out their research and built the concept map. In the third class, each topic was presented to the class. Their work on webquest was evaluated using a rubric.

The last stage was a general revision of the teaching point, discussing the content presented and finding connections among the different topics in the webquest. The final evaluation was in written format.

RESULTS

As regards the written evaluation, 77% of the students obtained a passing mark, while the remaining 23% was able to pass at a later stage: the make-up exam. 54% of the students obtained a high note. These results are better than in previous years when the topic was explained using more traditional methods, such as blackboard and books.

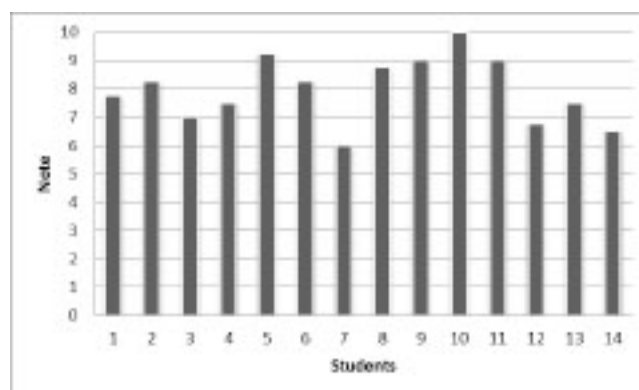


Figure 1. Marks (Note) obtained by the students in the written exam.

The concepts that were more difficult for the learners to understand; i.e. in which they obtained the lowest scores, were the properties of waves, the physical principles of involved in the process of photography, waves and their relation to health. The concepts that were more meaningfully grasped - with highest scores- were: reflection; refraction; interference and diffraction of waves; satellite images and color perception. When surveyed, the students commented that it was their first time working on a webquest, but they stated the despite the initial difficulties, they managed to complete the task within the stipulated time. The learners were already familiar with the CmapTools software, but 30% said they had difficulty expressing the concepts in the concept map. In general, they felt comfortable working on the webquest and online. 60% of the students said they considered this methodology a way to learn to be used more and more in the future. Everyone agreed that animations facilitate the understanding of concepts.



Figura 2. Screen shot of the Webquest

CONCLUSION

The use of ICTs generates enthusiasm and curiosity in the students. They were interested in the task. Nowadays, teaching practices need to incorporate tasks that engage students in the use of multiple representation formats and multiple perspectives.

WebQuests represent a cognitive bridge between learning and technological literacy content.

In this study, the students learned the teaching point –waves– through various activities that were integrated in the online environment: the students had to learn to surf the Net, search

for and understand concepts, as well as reading multimedia content and hypertexts. In addition, they learned how to evaluate information from various sources.

According Halat (2008), webquests have the following advantages:

- They constitute a teaching technique that improves students' motivation,
- They are an alternative tool to assess students' learning,
- They allow teachers to have an idea of the level of acquisition and knowledge application acquired by students as regards a given topic.
- They give teachers the chance to see and evaluate the students' ability in the use of technology for learning,
- They increase the teachers' creativity in thinking and writing, for they allow teachers to find fun and interesting stories or scenarios and to combine these with other subjects,
- They requires students to have an active role as learners,
- They allow students to use the Internet as an important tool.

Students need learning experiences that help them to understand quickly, think creatively and to construct the skills to access new knowledge and solve problems in today's world, where the Internet and ICTs are ubiquitous. The use of concept maps and webquest are a good combination of tools to create this type of learning opportunities.

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