Metacognitive questions to improve surfing and learning activities on the Web

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Abstract

The purpose of this paper is to present the set of metacognitive questions included in the Did@browser System, a meta-tool for Web surfing, developed at the Institute for Educational Technologies, with the aim of helping pupils to reflect on their own surfing strategies when they study on the Net.

Keywords: metacognition, learning environments, Web surfing.

1 Introduction

Although free navigation is an important part of the process of learning on the Net, we think that it is useful to give some prompts to encourage students who use the Web to be more aware of their surfing process; in this way it is possible to mitigate some negative effects such as disorientation, random browsing of hypertext documents, or surfing guided mainly by interface elements, and so on.

From a psycho-educational point of view the prompts are a cognitive aid or rather provide scaffolding [1] to the learner and are later removed gradually as he becomes able to perform parts of an activity autonomously.

Since the activity of surfing information on the Web may come about in a more or less haphazard way, the introduction of specific prompts is considered to be of use to a novice learner who still needs to acquire familiarity and awareness of his actions.

Valid prompts may consist in questions which aim to guide the learner in exercising executive control of his behaviour thereby employing strategies which allow him to assess the effectiveness of the procedures used to carry out a task.

The strategy of answering questions is both well known and effective [2] especially regarding reading comprehension, because it simplifies the
organization of topics and the linking of new information with previous knowledge. Recent research shows the effect of using metacognitive questions as a support for activating and engaging learners’ awareness thus facilitating their learning and improving the outcomes of a task [3].

Starting from these considerations we hypothesize that connecting metacognitive questions to strategic surfing elements could improve the user’s awareness during Web activities. As in a virtuous circle, we hypothesize that improving awareness during surfing could have a positive spin-off in the comprehension of online contents.

2 The Web-surfing meta-tool

The Web-surfing meta-tool has been developed to support the didactic surfing activities of inexperienced students.

As already discussed, in the context of teaching and learning activities based on the Web, specific cognitive tools have been designed for the acquisition and monitoring of metacognitive processes, so that these can be a more productive and enjoyable experience [4]. One of these tools is the meta-tool for Web surfing, developed at the Institute for Educational Technologies. It will be a part of a network learning environment named Did@browser, aimed at eliciting metacognitive and cooperative processes and so becoming itself a guide to promote awareness of Internet surfing [5].

From a technological point of view, the Did@browser system has a client/server architecture; in particular it is composed of two client software components and one server. The two clients are specific for teachers and students and are integrated in the browser. Both components send information to the server.

The teacher client allows the teacher to:
- program a set of metacognitive questions personalized for each student to administer during surfing;
- associate metacognitive questions to any links on a Web page;
- group the questions together according to categories chosen by the teacher;
- review student surfing from the data saved on the server;
- monitor a student during surfing.

The student client allows the student to:
- reflect on and respond to metacognitive questions associated to the links;
- be followed by the teacher during surfing.

The server communicates with the teacher and students components through the Cooperative Activity Control Protocol [6] which has been extended with the functionalities described above. All information sent to the server is organized and saved in a database and includes user profiles, the questions and their associations with the links and surfing trace.
Student surfing can take place with or without the support of metacognitive questions; the teacher decides whether to enable the functionality.

In both cases the following parameters are saved: date, time, name of the link, URL [7]. When the functionality of the metacognitive question is active, the server also saves the question with the student’s corresponding answer. The question appears when the student clicks on the hot word.

The particular meta-tool functionality we wish to consider in this work is the possible association of meta-cognitive questions to the strategic elements of Web surfing. Using this tool, the teacher can select specific questions and activate them during the student’s surfing, in order to motivate their choices and to increase their awareness when surfing through information on the Web.

3 Metacognitive questions for Web surfing

Our method for defining the questions to integrate into our system followed the steps listed below:

- identify strategic elements of the interaction user/Web (Web pages, hot words, buttons included in the page, buttons of the browser toolbar, indexes, images, etc.);
- associate to these elements the most common behaviours related to them;
- define metacognitive questions connected to each behaviour such as:

  - Why have I clicked on this link?
  - What information do I expect to find?
  - What other surfing tools were there on the page?
  - Why have I selected this link rather than the others on the page?
  - Have I already explored the other objects on the page (images, links, text)? If not do I expect to do so?
  - Do I intend to return to this page? Why?
  - Why have you returned to this page?
  - Has the image which I’ve seen helped me to understand better?
  - Have I found the information I expected on this page?
  - What has interested me most on this page?

As we can see, some questions can be asked at the moment when the student clicks on any surfing object, while other questions are adapt to specific actions. The purpose of these questions is not to provide explanations about how to surf but to act as a counsellor and to encourage and lead the learner to carry out his study on the Net more effectively.

This set of questions will be integrated in the Did@browser system and will be submitted, during the experimental sessions which we are planning, to an experimental group of students.

Another set of questions was defined to motivate students to evaluate the results of their activities regarding both the process and the quality of information obtained. These questions are:
What have I learnt surfing on this site?
What topics are dealt with on this site?
What sequence of actions have I followed to surf the information on the site?
Has my strategy of surfing enabled me to reach my aim?
What do I think will help me to surf better next time?

These latter questions will be submitted both to the experimental group and the control group to assess whether the subjects in the former group have acquired more information and have become more aware of their strategies for surfing than the latter group.

The analysis of stored data during the surfing activities will also allow us to identify the cognitive and metacognitive strategies which the subjects adopt and to establish whether the use of the meta-tool modifies the style of Web surfing. In particular, it will be clear whether there are any differences between the two groups regarding the main behaviours observed during net-surfing. According to the literature [8, 9], the main behaviours are:

- Backtracking: frequent use of the back button to return to a page already viewed;
- Scrolling: reading of the whole text present on a page and activation of links at the centre and at the end of the page;
- Target: surfing activity aimed at finding a specific site or link;
- Exploratory moves: surfing activity aimed at understanding how the information is organized within the site;
- Looping: returning repeatedly to the same pages.

4 Ongoing project

Testing of the system will involve 30 middle school pupils in Palermo. They will be divided into two groups: 15 of them, the experimental group, will be involved in a Net-surfing activity supported by the metacognitive tool; 15 others, the control group, will be surfing the net to reach the same didactic aims, but without the support of the experimental tool.

The two groups of students will be chosen randomly, so as to include children with heterogeneous Net-surfing skills.

The experimentation activity will consist in surfing a Web site prepared on purpose. The activity will be divided into three phases, for both groups of pupils.

Phase 1. The pupils surf the Web site without a specific aim, for a limited time (about 20 minutes).
Phase 2. The pupils have to identify the main topic of the site.
Phase 3. The pupils surf the site to collect as much information as possible regarding a specific topic. This phase is repeated several times with different topics.
The results obtained from the experimentation will allow us to assess whether the use of metacognitive questions included in the meta-tool promote greater awareness during the surfing activity. Moreover, we will verify whether the use of meta-cognitive tool improves the comprehension of Web topics. The feedback obtained from the experimentation will be used to optimize the features of the tool and to develop other new functionalities.

Reference


