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WWW-Based Seminar in the Learning of Knowledge Work Course

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ABSTRACT

The Internet can be used to solve pedagogical problems. To give an example, seminars for crowded courses exceeding a hundred participants would not be possible without web-based arrangements. We organized a web-based coursework and seminar during the Knowledge Work and its Tools course for some students (experimental group). Simultaneously, we ran the same course including a conventional coursework and seminar for other students (control group). During the coursework and while in the seminar the students were expected to work in small groups. In the web-based seminar each group had their own workspace in the Web CT environment for publishing and presenting coursework. At the final phase the students were expected to familiarize themselves with the presentations of other groups. In this paper we analyze the benefits of the features of our WWW-based seminar based on pre- and post-questionnaires. These features include (1) the coursework generally, (2) authoring the coursework, (3) familiarizing with the coursework of other groups, and (4) using a Web CT tool and its presentations feature. Additionally, we analyze how motivated the students were in the coursework. Generally, our study found that a web-based coursework and seminar is as beneficial as a conventional coursework and seminar. However, while the older students were more motivated by the WWW-based coursework and seminar, the students of the faculty of information technology were more motivated by the conventional coursework and seminar.

INTRODUCTION

Today, students are more interested in the learning of informatics. However, this results in crowded courses and impossibility to organize seminars where students can discuss each other's work. One solution to this problem may be web-based seminar work. In a web-based seminar, students can place their seminar assignments and presentations in their own web-based workspaces. Other students can visit these workspaces and comment on the work.

Lecture-based teaching is problematic. Problems associated with this type of teaching include ineffectiveness, passiveness, and alienation of students (Isaacs, 1994 & Rosenthal, 1995). Thus, substitutes for lectures should be considered. In informatics a web-based seminar as a natural alternative can bring constructivist learning to education whereupon learning is an active process of knowledge constructing.

One of the goals of the Knowledge Work and its Tools course is teaching the basic ideas of groupware. Using Web CT and its presentation feature it is possible to demonstrate the idea of shared workspaces in practice. During the process of seminar work students can familiarize themselves with shared workspaces. This occurs by publishing and presenting seminar work; by commenting on seminar works created by other students (or groups); and by reading comments expressed by other students.

This paper introduces our web-based coursework and seminar as a learning assignment and, in addition, the preliminary analysis of it. In this analysis we want to know

- how the students experienced (or self-assessed) the coursework,
- how motivated the students were after the coursework,
- how the students experienced authoring the coursework,
- how the students experienced reading other's coursework and the closing seminar, and
- how the students experienced the Web CT tool.

Before discussing the study itself, we first provide the theoretical background of our study.

CONSTRUCTIVISM

Behaviorism is interested in a student's behavior in relation to teaching while its opposite constructivism is interested in the mental processes which affect the behavior of a student (Risku, 1996). A traditional lecture is mainly based on the behaviorist approach while coursework and projects are typical of constructivist learning.

Constructivism asserts that learners construct knowledge by making sense of experiences in terms of what is already known (Brandt, 1997). In the constructivist approach learning is comprehended as the development of mental models. Brandt (1997) emphasizes that constructivism is an essential basis when applying the WWW for teaching and learning. It provides the teacher with a structure for teaching. By focusing on concepts and connecting them to mental models, teachers can gain both confidence and control over the amount of material they cover in the small blocks of time usually allotted to teaching and training. Integrated with experiences that learners use to alter and strengthen mental models, the constructivist approach to teaching information retrieval also gives users the structure needed to get the most out of the Internet. Despite the promise of constructivism several researchers emphasize the importance of guidance.

THE WWW IN LEARNING

The problems inherent in any information system such as disorientation, navigation inefficiency and cognitive overload are multiplied on the Internet (Brandt, 1997). However, these problems can be overcome using a suitable pedagogical approach and/or appropriate tools.

In the case of coursework one approach may be by seeing Internet tools as cognitive tools, in other words, tools for knowledge construction. Cognitive tools actively engage learners in the creation of knowledge that reflects their comprehension and conception of the information rather than focusing on the presentation of objective knowledge (Jonassen, 1992).

In the same way, web-based tools, like Web CT, can be seen in an active context. The students can use Web CT and its presentation feature for introducing their ideas, receiving feedback, and managing coursework.

In the context of the first courses in informatics it is important, additionally, to discuss education from the perspective of situated action theory and cognitive flexibility theory. These theories can bring forth some important views related to education if we have courses with heterogeneous students. According to situated action theory, the success of a computer-supported learning environment depends on the context in which that software is used (Bruckman et al. ,1997; Koschmann, 1996). It emphasizes a person's responsiveness to the environment and focuses on the improvisory nature of human activity (Nardi, 1996) and the local management of activity as mediated by relevant environmental cues (Agre & Chapman, 1987; Suchman, 1987). The implications for learning are that appropriate actions are generated from recognition of appropriate opportunities given by the context. In addition to situated action theory, Jacobson et al. (1996) also emphasize the meaning of cognitive flexibility theory affecting

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hypertext-based learning. It proposes that complex knowledge may be better learned for flexible application in new contexts by employing case-based learning environments that include features such as: (a) the use of multiple knowledge representations, (b) linking abstract concepts in cases to depict knowledge-in-use, (c) demonstrating the conceptual interconnectedness or web-like nature of complex knowledge, (d) emphasizing knowledge assembly rather than reproductive memory, (e) introducing both conceptual complexity and domain complexity early, and (f) promoting active learning.

In the case of a web-based seminar it is useful to discuss the WWW from the perspective of media research. Haythornthwaite (2001) stresses the interpersonal ties that affect the character of web-based communication and strong ties between students improve web-based communication. Thus, we claim that traditional teaching and learning are needed as a part of a course. The traditional parts of a course develop these ties in the way that is not possible in a totally virtual training setting. In this way we can create contexts in which effective WWW-based learning is possible and the use of the WWW in the spirit of situated action theory is possible.

Based on the above we stress the following three issues. First, we must discuss what the right amount of behaviorist teaching should be. Second, we must analyze what the right way to use the WWW is. Situations conducive for successful web-based learning must be created. Third, scaffolding support is needed to support constructivist learning based on the WWW. We claim that after the introductory course level many courses of informatics can be built on the constructivist approach by organizing coursework.

METHODS

Experiment

The themes of the course Knowledge Work and its Tools are (1) knowledge work and its productivity, (2) personal computer software, and (3) groupware. The course was inspired by a textbook, Personal Productivity with Information Technology (Davis & Naumann, 1997). The course of the academic year 2000-2001 lasted seven weeks including lectures (14 hours), practical exercises in skills with personal computers and groupware (28 hours) as well as the final seminar and exam.

The core of the course consisted of coursework in which students were expected to select a typical knowledge work profession (e. g. lawyer, high school teacher, or system analyst) and analyze how different IT tools improve the productivity in this profession. The students worked in groups consisting of 1 to 5 students. The result of coursework was a coursework report covering all aforementioned aspects. Before the start of the coursework all students were randomly divided into groups for conventional coursework and seminar and groups for Web CT-based coursework and seminar.

For the conventional coursework requirements the coursework reports were written in six weeks. The reports were presented in a conventional seminar. We had four sessions for the presentations and in each session the main points of six coursework reports were presented to other participants of a session. We had two hours for those six presentations in each session. After a presentation, the other session groups were expected to comment on the findings of the presenting group. The coursework groups of each session were expected to familiarize themselves with the coursework of three other groups before the session. The coursework reports were distributed in the way that each coursework report had been read by at least three other groups. The students acquired the reports of other groups two days before the seminar.

In the Web CT-based coursework the groups placed the presentations on their own web-based workspaces. Other groups were expected to familiarize themselves with these presentations as in the conventional coursework. All the groups had permission to upload files to all workspaces. Thus, it was possible to upload comments regarding the work of other groups to any workspace. For authoring the coursework, the Web CT-based groups had as much time as the groups of the conventional coursework (six week). After these six weeks the groups were expected to comment on at least three other coursework presentations, as was the case in the conventional seminar. These comments were placed on the Web CT workspaces. The students had five and half days for this.

The workspaces were created before the course using the presentation feature of the Web CT. All the groups, involved with the Web CT-based coursework, got permission to upload, download, and view material on any workspace. Thus, communication was possible between the groups, enabling the web-based seminar. Figure 1 (see next page) shows a simplified example of the first page of students' presentations on the Web CT. With the help of this page the students had a possibility to upload, download, create, and see files by clicking Edit Files first.

Sample

Eighty-seven randomly selected students, 33 females and 54 males, whose mean age was 22 years (range 18-42 years), participated in the experimental group including the web-based seminar. Fifty-three additional randomly selected students, 20 females and 30 males, whose mean age was 23.5 years (range 19-44 years), were involved in the control group. All the students used 13 hours for the coursework on an average.

The pre-questionnaire filled in by the students at the beginning of the course showed that the students - both in the experimental group and the control group - were at the same competence level in regard to

Figure 1: Starting point of Web CT-based seminar

the main topics of the course. The students worked in groups of 1 to 5 students A notable part of the students (over 38%) worked in the group of five students both in the experimental group and the control group. In the experimental group 39.1% of students worked in a group of four students, 16.1% of them worked in a group of three students, and 4.6 % of them worked in a group of two students. One student completed the coursework individually in the experimental group. In the control group 9.3% of students worked in a group of four students, 18.5% of them worked in a group of three students, and 16.7 % of them worked in a group of two students. One student completed the coursework individually in the control group.

Collecting data

Data was collected by administering both pre- and post questionnaires. The respondents rated each feature of the coursework with regard to how they experienced (or self-assessed) them (from 1=very uninteresting to 5=very interesting). These features included

- the coursework generally,
- authoring the coursework,
- reading other's coursework presentations and participating in the closing seminar, and
- using the Web CT tool in the experimental group.

Additionally, to evaluate motivation the respondents rated how interesting they considered the coursework (where 1=very uninteresting and 5=very interesting), and (b) how beneficial they considered the coursework (from 1=very useless to 5=very useful).

Results

In order to compare means we ran the one-way ANOVA in the cases where the data agreed with the normal distribution. We ran the Mann-Whitney test in the case of motivation because the data in regard to motivation in the coursework did not agree with the normal distribution. Additionally, correlation coefficients were calculated to study the benefit of the web-based seminar and coursework.

How Students Experienced Coursework Generally

The students were expected to rate how they experienced the coursework generally. According to the one-way ANOVA test, the difference between the experimental group (n=87 and mean=3.63) and the control group (n=52 and mean=3.69) was not significant (p= .625).

How Motivated the Students Were After Coursework

In learning from text, motivation is understood both internally and externally (Linnakylä, 1988). The students were asked to explain both how interesting (internal motivation) and how beneficial (external motivation) they regarded the coursework and the closing seminar. Thus, motivation is assumed to be the sum of interest and benefit. The Mann-Whitney test shows significant difference between the experimental group (n=87 and mean=6.41) and the control group (n=52 and mean=7.13) (p= .006).

How the Students Experienced Authoring Coursework

The students were expected to rate how they experienced authoring the coursework. According to the one-way ANOVA test, the difference between the experimental group (n=86 and mean=3.51) and the control group (n=52 and mean=3.56) was not significant (p = .737).

How the Students Experienced Reading Other's Coursework Presentations and Participating in the Closing Seminar

The students were expected to rate how they experienced reading other's coursework and participating in the closing seminar. According to the one-way ANOVA test, the difference between the experimental group (n=84 and mean=3.25) and the control group (n=50 and mean=3.26) was not significant (p = .941).

How the Experimental Group Experienced the Web CT Tool

The students were expected to rate how they experienced the Web CT environment as a learning tool. The result shows that their attitude is mainly positive concerning the use of the Web CT as a coursework tool (mean 3.23).

Comparing the Main Features of the Web-Based Seminar

We compared the means of the students' ratings concerning two basic features ((1) authoring the coursework and (2) reading other's coursework) of the coursework. The test did not show significant differences between the ratings about authoring the coursework and familiarizing with other's coursework presentations (p=.068 in the experimental group and p= .052 in the control group).

Evaluating the Effect of Age, Gender, Size of Group, and Faculty

In order to clarify if the age affects learning, the Pearson correlation coefficients were calculated. The correlations were not significant in most cases. Motivation in the coursework was significantly higher in older ages in the experimental group (correlation coefficient .244 and p=.023). Thus, based on motivation the Web CT-based coursework is more suitable for older students and in our case for the students whose age is more than 22 years old.

Analyzing ratings based on gender shows that the gender does not affect the perceived benefit of any studied feature (coursework generally, motivation in coursework, authoring coursework, familiarizing with other's work). The one-way ANOVA test concerning any feature except motivation in coursework did not show significant differences in the ratings between genders either in the experimental group or the control group (p varying from .076 to .690). In the case of motivation the Mann-Whitney test did not show significant differences between the experimental group and the control group for both genders (p = .009 in the group of males and p=258 in the group of females).

In order to clarify if the size of a group affects learning the Pearson correlation coefficients were calculated. The correlations were not significant in all cases (p varying from .083 to .969). Thus, analyzing ratings based on the size of a group shows that the group size does not affect the benefit of any studied feature.

Finally, we compared the ratings of the students of the faculty of information technology to the ratings of the students of other faculties (including economics, education, humanities, and natural sciences). Analyzing ratings based on the faculty shows that the faculty does not affect the perceived benefit of any studied feature (coursework generally, authoring coursework, familiarizing with other's work) except motivation in the coursework. The one-way ANOVA test in regard to any feature except motivation in the coursework did not show significant differences in the ratings between the students' faculty either in the experimental group or the control group (p varying from .264 to .940). In the case of motivation the Mann-Whitney test showed significant difference between the experimental group and the control group in the faculty of information technology (p= .004). These students were significantly more motivated by participating in the traditional coursework. However, this difference was not found between the experimental group and the control group in other faculties (p= .682).

DISCUSSION

The effect of all studied features is equal in both the traditional coursework and seminar and the Web CT-based coursework and seminar. The differences between the two learning methods of this study can be found by studying motivation: the students were generally more motivated in the traditional coursework. However, the Web CT-based coursework suits a little bit better for older students who may have some prior university studies and/or working experience. The traditional coursework suits slightly better for the students of information technology or information systems science.

Both methods are equally appropriate for learning by constructing knowledge in the spirit of constructivism. From the perspective of

situated action we can also claim that the traditional parts of a course can create a good basis for web-based activities. However, our study must be discussed looking at the goals of the course. Additionally, we need know whether the WWW-based seminar improves learning or not and why so, and which are the features of a web-based seminar that enable building stronger ties between students - a basic requirement in successful web-based communication (Haythornthwaite, 2001).

Nevertheless, this paper demonstrates that a seminar for a crowded course is possible using the Web CT environment. Without the Web CT or other related tool it may not be always possible.

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