

# PROBLEM BASED LEARNING OVER THE INTERNET

Frank Schindler

## ABSTRACT

The main goal of this paper is to discuss a new form of learning that would be appropriate for application in Learning Management Systems utilized in distance education courses over the Internet. It is supposed to be good for both individual and group study. In such an online learning, it is as a rule assumed, that students carry out a lot of self-study. To make that productive and not wasteful the self-study should be accompanied by solving problems in a virtual classroom. Accordingly, one such a new method of learning is problem-based learning. It can be easily implemented in the form of discussion forums. Students ought to be required to solve problems, present and discuss them in a very specific manner in a web-based discussion forum. An example of problem based-learning will be provided.

## KEYWORDS

Web-based learning, e-learning, problem-based learning, virtual learning environment, discussion forum, feedback, plagiarism, WebTycho

## INTRODUCTION

New communication and information technology brought about a revolution in modern didactic technologies used in academic world, because they let to sense knowledge through more senses and as a result of it they may accomplish higher effect in learning. An enormous quantity of new information demands gradually rising requirements on the level and quality of learning. Accordingly, there is a need to apply new forms, methods and also study support tools that are capable to receive, process and present a wide range of information. At the present time, learning management systems (LMS) represent the most flexible way of modern learning. They could be characterized as a collection of programs specially intended for creation, organization and offering of online courses in virtual environment. To take a full advantage of them a new form of learning is needed. Certainly, one such new form of learning is a problem-based learning (Birch, 1986).

In this article I would like to share with you a couple of experiences related to problem-based learning that I gained during teaching online computer and information science courses at the University of Maryland University College<sup>1</sup> (UMUC). UMUC owns a proprietary LMS system called WebTycho (Schindler, 2004). WebTycho supports problem-based learning via two constructs: web-based conferences and study groups. In its essence, both of them can be viewed as a discussion forum which is integrated with the rest of a virtual classroom in a very definite manner within WebTycho system. Reason why we need two different kinds of forums to support such learning is quite obvious. Conferences are meant to support individual learning, whereas the study groups are good for group learning.

---

<sup>1</sup> University of Maryland University College, European Division  
Im Bosseldorn 30, D-69 126 Heidelberg, Germany

## **PROBLEM BASED LEARNING OVER THE INTERNET**

Problem based learning relies heavily on the analysis of learning. It is well-known that acquisition of new knowledge is much simpler when we already know similar things and consequently we have created in our memory an internal structure that allows to understand this information. On the other hand, if we try to learn a completely new knowledge we have to also create from scratch an entirely new structure associated with it and thus the learning process becomes not only slower, but also much more difficult (Hmelo, 1995; Hmelo, 1997; Hmelo, 2000; Huba, 2003). Such a process of learning can be facilitated if we first concentrate on a model creation implied by experience gained through solving the tasks. We have to keep in mind, that no matter how attractive and simple presentation of knowledge is, it does not explicitly support any creation of such structures. Therefore, all this implies the need of the problem-based learning supporting the learning by doing.

A discussion forum allows formation of an asynchronous dialog to share knowledge in a group, in which additional information is created. At the very beginning of the dialog, the teacher should make a short introduction into the topic and pose a question (task) to be solved in the forum. If the participation of students is not compulsory, only 2-3 students will do the task. Therefore it can not be of a disadvantage to ask all students to solve the task. In addition to that the teacher can complement his task by subtasks that are given to a specific student depending on his actual or partial solution. Teacher should watch closely over the actions in discussion forums and guide them if necessary by making a summary or posting new subquestions. This sort of activities in the virtual classroom are useful only provided there are not too many of them. You should take that into account, otherwise students are going to skip them due to shortage of time.

A web-based conference is a specific discussion forum implemented in WebTycho that restricts the allowed actions on the side of the student. Questions posted in conference area are made solemnly by the teacher. Students are to respond to conference questions within a given deadline. After that, the conference area of the forum should be changed to read only status to allow smooth transition to the next conference. Too many active conferences could pose a danger, that students won't be able to focus on a specific topic or task. Thus the format for the conferences is somewhat limited by the following scenario. Students do their independent readings from prescribed study materials by strictly adhering to the course syllabus. In the nick of time, teacher is asking questions in conference area of the virtual classroom and students respond to them or they also may comment responses of their classmates. On this place, I would like to point out that students' comments in conference area are highly desirable. Teacher can not read and comment all of the responses right away. Students anticipate relatively fast feedback regarding their responses. Always there are some students who fail to answer given questions, but they are able to make valuable comments about posted answers of their colleagues. Additionally students seem to be very good at correcting responses of their classmates. Examples of a dialog from a web-based conference are given in figures 1-4, see below.

Web-based study groups are usually made to reflect most recent happening in the virtual classroom, e.g. they ought to be coupled with newest online home assignments, group projects or tests. Here, the main difference is, that students can ask questions in study groups. Feedback provided in them is supposed to be much faster than the one made in conferences. Typically it should be less than a couple of hours or in the worst case less than 48 hours. Students' responses to other student's questions in study group area are necessary to provide such speedy feedback. Here, the teacher may enter the stage by answering an open study group question only if it stays unanswered for a longer time period approaching 48 hours and/or if it is unnecessary to shift the study group from a dead point.

Evaluation of discussion forums should be made by the teacher. Extensive marking of all conference (or study group) responses could be very challenging and also time consuming. Therefore instead of that, I merely comment each student response and finally I evaluate active conference participation and provide sample answers. Based on my online teaching experience conference participation ought to be counted toward the final class mark for a couple of reasons. E-learning should never boil down to self-

study and as a result of it some of its parts must be compulsory. Active conference participation often leads to the formation of a virtual learning community associated with given online course. Students form this way personal and social relationships and moreover they feel to be part of a community.

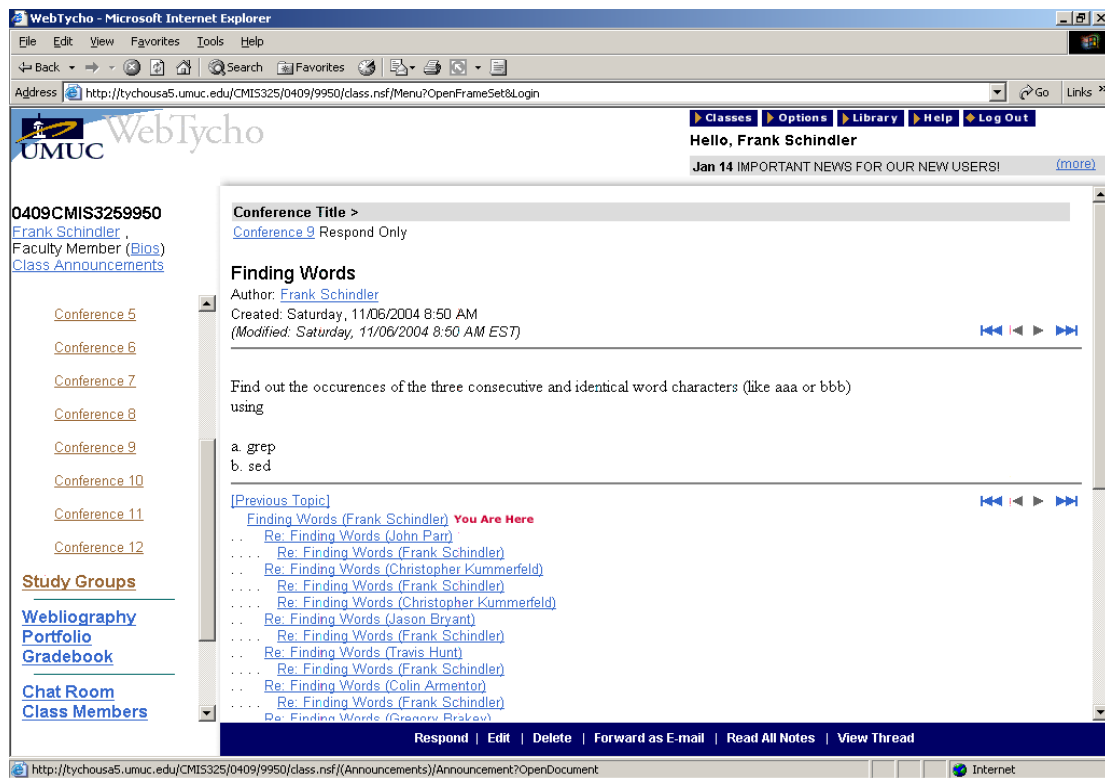


Figure 1. Screen Shot from WebTycho - Task given to students in conference 9

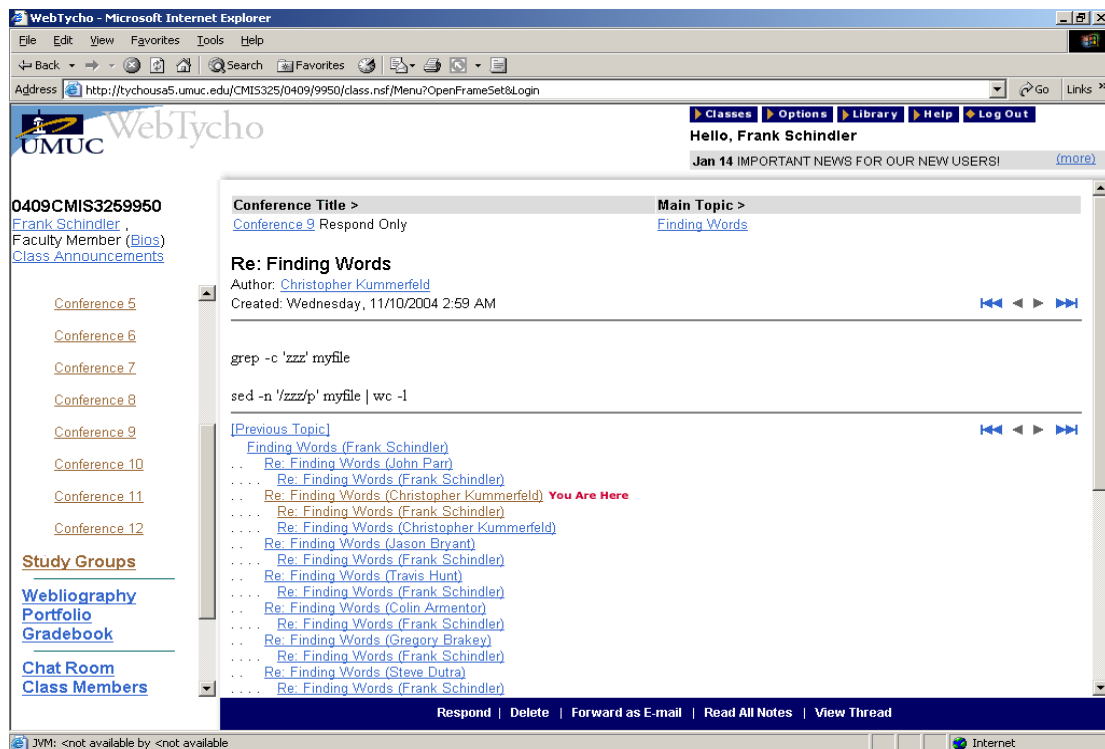


Figure 2. Screen Shot from WebTycho - Solution of a student to the task given in figure 1

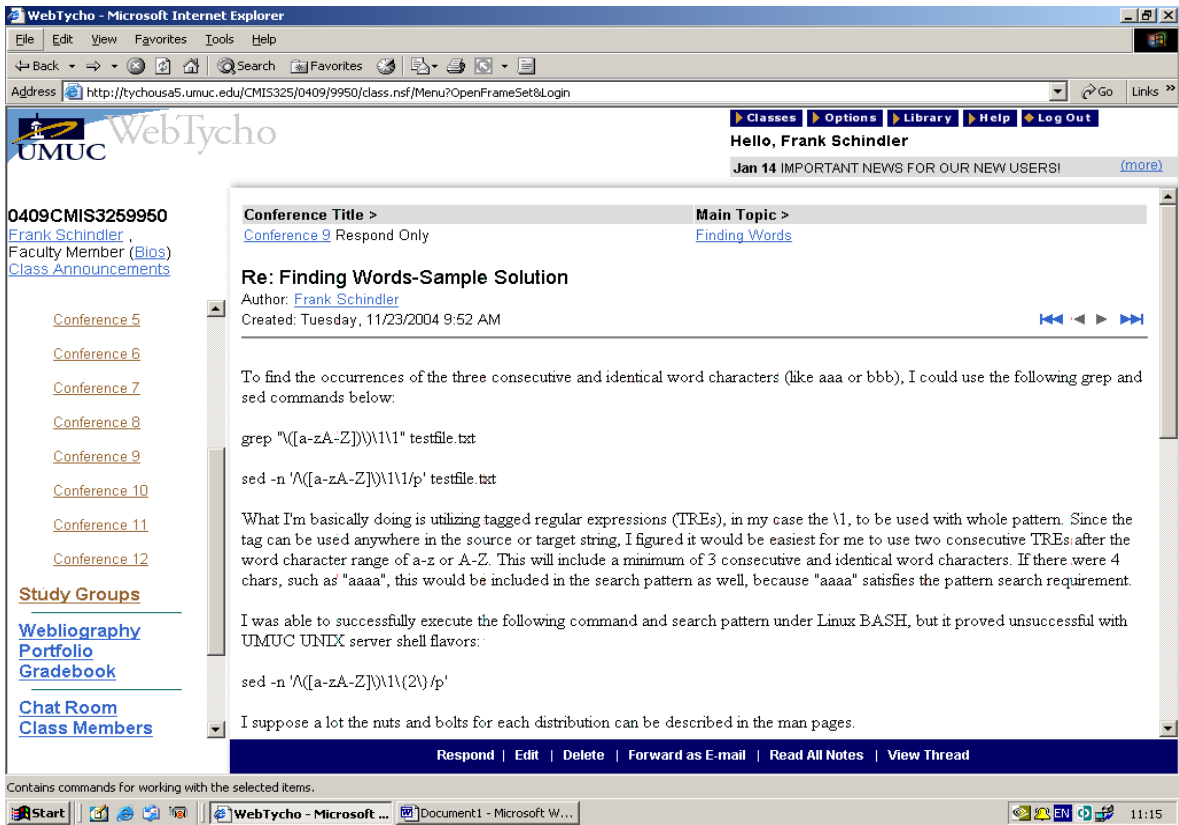


Figure 3. Screen Shot from WebTycho - Sample solution made by teacher to the task in figure 1

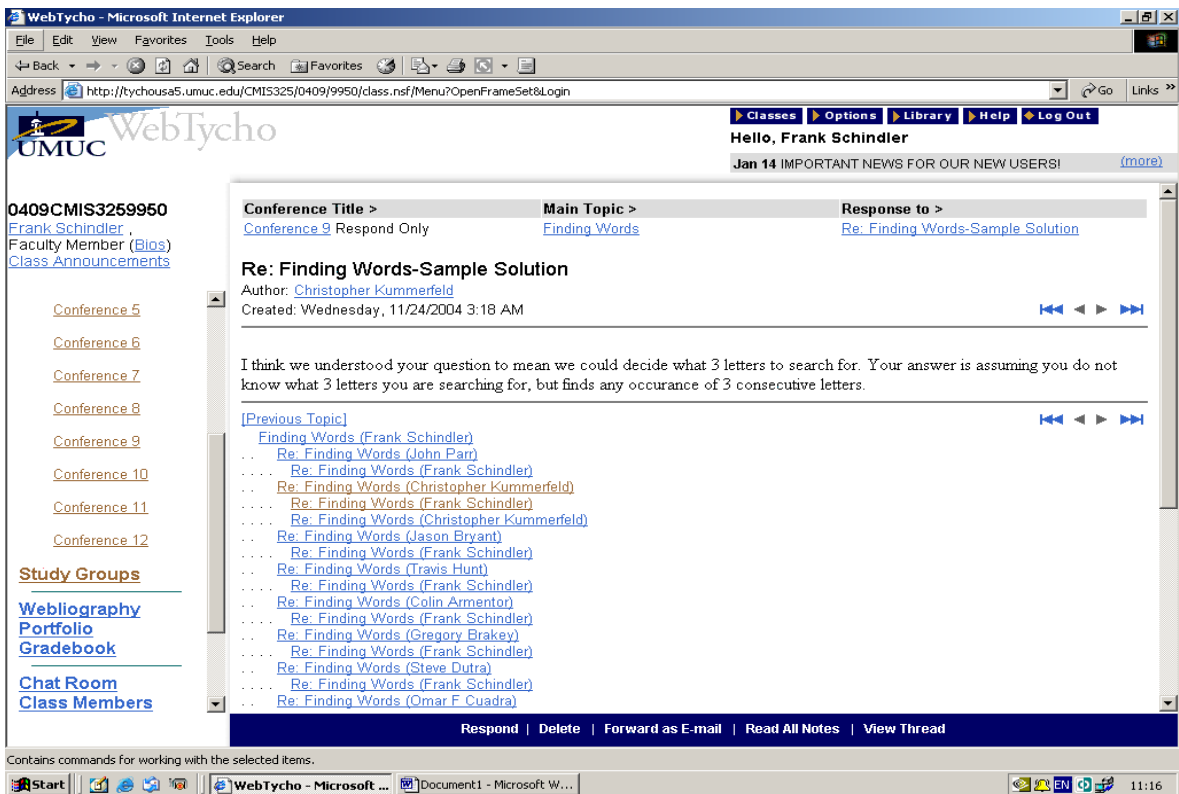


Figure 4. Screen Shot from WebTycho - Comment of a student to the task given in figure 1

Coping with plagiarism is another major task for the online teacher. Plagiarism of any kind ought to be strictly forbidden in all virtual learning communities. Institution-wide rules must be provided for proper copying and citing of knowledge coming from other sources than official study materials both in electronic and paper form for every student. There can not be a bigger problem for the teacher than trying to resolve such a case: "who copied" and "what is copied" provided it becomes wide-spread. Therefore it makes sense to repress it from the beginning. Time stamps on the responses of students can play here an important role in deciding who first submitted the given piece of work. Also google search engine may be used to locate suspicious sources of knowledge on the Internet.

## **CONCLUSIONS**

In this paper I discussed a new form of online learning often referred to as problem based learning, which is particularly suitable for usage in a virtual classroom taught via an LMS system over the Internet. This kind of learning can be implemented by means of properly chosen discussion forums, that may be either strictly organized and managed as web-based conferences, or also as somewhat less structured study groups. That way both individual and group study should be supported. Problem based learning ought to be an indispensable part of every meaningful distance learning over the Internet above all as a complement to self-study, for it supports not only better understanding of new stuff, but also creativity and writing skills of students. Moreover students involved in it may feel to be part of a virtual learning community. Of course, that could help to overcome the feeling of isolation, that most of online students suffer from. Evaluation of the written work of students done as a part of problem based learning within discussion forums is for sure a challenge for every online teacher. Though, it requires some experience, most definitely it can be done. There is no need to mark every little piece of student's work. Verbal evaluation may suffice in most cases like that. Plagiarism poses a certain danger for problem based learning over the Internet, and therefore it should be uprooted from the very beginning. Computer literacy is needed for an online problem based learning to function smoothly. It includes full mastery of essential features in a plain text editor such as cut-and-paste technique, work with text files, rich text files and html files. Any file documents that could port computer viruses should be avoided at any cost for safety reasons (Pfleger, 1997). Teachers could offer an option to „download to a local PC“ as many of their electronic study materials as possible. We should keep in mind, that most of the course work completed by students is often made off-line on a piece of paper. The bigger part of online students are very good at using text editors. Simple text files are easy to manipulate and fast to display or download. We have to remember that students might have some problems with being online everywhere and always. Furthermore a printed version of web-based documents is often awkward when compared to a corresponding printout from a standard text editor.

## **REFERENCES**

- Birch, S. (1986). Towards a model for problem-based learning. *Studies in Higher Education*, 11(1), 73-82.
- Collis, B. and Moonen, J. (2001). *Flexible Learning in a Digital World*, Kogan Page, London, UK.
- Coomey, M. and Stephenson, J. (2001). "Online learning: it is all about dialogue, involvement, support and control – according to research". in: Stephenson, J. (Ed.) *Teaching and Learning Online*, Kogan Page, London, UK.
- Dobbs, K. (2000). Simple Moments of Learning. *Training*, 37 (1), 52-54.
- Distlehorst, L.H. and Robbs, R.S. (1998). A comparison of problem-based learning and standard curriculum students: Three years of retrospective data. *Teaching and Learning in Medicine*, 10(3), 131-137.

Huba, M., Žáková, K., and Bisák, P., (2003). *Www and Education* (in Slovak), STU Publishing, Bratislava, Slovakia, ISBN 80-227-1999-4.

Hmelo, C. (1995). *Problem-Based Learning: Development of Knowledge and Reasoning Strategies*. Proceedings of the Seventeenth Annual Conference of the Cognitive Science Society, Hillsdale, NJ, Erlbaum, 403-408.

Hmelo, C.E. and Ferrari, M. (1997). The problem-based learning tutorial: Cultivating higher-order thinking skills. *Journal for the Education of the Gifted*, 20, 401-422.

Hmelo, C. and Evenson, D. (2000). *Problem-Based Learning: A Research Perspective on Learning Interactions*. Lawrence Erlbaum Associates, Mahwah, NJ.

French, D., Hale, C., Johnson, C. and Farr G. (1999). *Internet-based learning*, Kogan Page, London, UK.

Jolliffe, A., Ritter, J. and Stevens, D. (2001). *The online learning handbook: developing and using web-based learning*, Kogan Page, London, UK.

Leonard, D.C. (2002). *Learning Theories A to Z*. Oryx Press, Phoenix, AZ.

Maudsley, G. (1999). Do we all mean the same thing by "Problem-based Learning"? A review of the concepts and a formulation of the ground rules. *Academic Medicine*, 74(2);178-85.

Pfleger, Ch. P. (1997). *Security in Computing*, Prentice-Hall International Inc., Upper Saddle River, NJ, ISBN 0-13-185794-0.

Schindler, F. (2004). *WebTycho: A Tool for Distance Education over the Internet*. Proceedings of International Conference "E-Learn 2004", Žilina, Slovakia, ISBN 80-8070-190-3, 231-236.

Schindler, F. (2004). *Virtual Communities in WebTycho*. Proceedings of Colloquium eLearning '2004, Hradec Králove, Czech Republic, ISBN 80-7049-798-6, 376-379.

Schindler, F. (2004). *Virtual Communities in E-Learning*. Proceedings of International Conference Virtual University '04, Bratislava, Slovakia, ISBN 80-227-2171-9, 281-283.

Wenger, E. (1998). *Communities of Practice: Learning, Meaning, and Identity*. Cambridge: Cambridge University Press, UK.

Frank Schindler  
Department of Applied Computer Science and Engineering  
Faculty of Electrical Engineering, Slovak Technical University  
Ilkovicova 3, SK-812 19 Bratislava, Slovakia  
Email: frank.schindler@stuba.sk