PTBL:
A Learning Model Based on PBL and TBL for Training Soft Skills Supported by 3D Virtual Pedagogical Platform (3DVPP)

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ABSTRACT
With software projects are becoming increasingly complicated, soft skills such as collaboration, effective communication, rhetoric, socio-cultural, accountabilities and collision resolution in real-life software projects, as well as computer programming are badly required for team members to cooperate and finish the strenuous projects. Therefore it is fundamental for software engineering students to improve such skills, if they want to accelerate the success of teamwork. Nowadays, the ability of effective cooperation and communication is much more important than raw programming talent. Teams with average programmers who communicate well are more likely to success than those with superstars but not good at communication. At the same time, these soft skills are just difficult to teach and learn which require true collaboration and communication between students. The traditional learning activities for training soft skills are insufficient based on the facts that teachers and mentors pay too much attention on professional and technical abilities instead of soft skills. In this paper, a novel learning model called Problem and Task Based Learning is proposed which includes Problem-Based Learning, Task-Based Learning, and Web3D technologies. This new model could elevate the teamwork skills in software engineering and overcome the common limitations of the traditional course. This paper also presents two courses using this learning model-a Task-game course and a virtual 3D meeting, as well as some experimental results obtained from the students and the teachers who have participated in the two case studies. Both students and teachers are from Software Engineering Department of Tsinghua University.

Keywords: Collaboration, Communication, Learning Model, Soft Skills, Web3D Technologies

INTRODUCTION
The constructivists claim (Morch, Dolonen & Nexvdal, 2004) that learning occurs between individuals and the external condition. The constructivist theory (Morch, Dolonen & Nexvdal, 2004) also demonstrates that individual’s learning will be more effective through share and collaboration, and it is the primary theoretic reason that inspires pedagogical use of educational virtual environments (EVE), which also means the importance of collaborative study.
with 3D EVE to elevate and inspire team spirits (Morch, Dolonen & Nexvdal, 2004).

As to software engineering and computer programming study, it acquires not only professional and technical abilities, but also well-behaved soft skills when working together with team members, these soft skills include cooperation, effective communication, rhetoric, socio-cultural, accountabilities and collision resolution. Working well with others, communicating with others and interacting, are much more important than raw programming talent. Teams with average programmers who communicate well are more likely to success than those with superstars but not good at communication. These software skills have enjoyed wide popularity in all areas of life. They have played an increasing vital role in team projects’ success and also helped those common programmers gain great success. The importance of soft skills cannot be denied or ignored in the information and technology age. Good soft skills, which in fact are scarce in the highly competitive world, will help you prominent in a world filled with lots of routine job seekers who only have average skills and talent. Soft skills are especially important in software engineering and computer programming, where tasks are general too strenuous for individuals. In this case, effective teamwork is crucial to finish all kinds of tasks, such as a new operating system project, a large-scale software project, a new compiler or other collaboration tools and a 3D virtual pedagogical platform.

The traditional learning activities for training soft skills are insufficient based on the facts that teachers and mentors pay too much attention on professional and technical abilities instead of soft skills. Student-centered training is very different from the traditional teaching and studying which focuses on listening and noting. Many universities and colleges have increasingly paid emphasis on teamwork technologies in recent years, for instance, they give their students homework in group assignments named Group Work (GW) (Koivisto & Vuori, 2007). In china, many famous universities like Tsinghua and Peking University require every course should have a GW at the end of the semester, but due to efficiency in leading and organization, students always just work on their own portions separately and then collect the results from all the other group members, which have cut down the communication and the collaboration and result in reducing the practice aspect of soft skills.

This research aims to design a learning model called Problem and Task Based Learning (PTBL) which includes PBL and TBL to train soft skills, and then implement this learning model within 3D Virtual Pedagogical Platform (3DVPP). It especially suits for the practice of soft skills in software engineering and computer programming. According to the PTBL model and the characteristics of software engineering learning, we use Web3.0 and Web3D technologies to build a virtual meeting room and a course named Task-game for software engineering students. In this 3D virtual pedagogical environment, visitors and students will interact and act as it do in the real life, where they can enjoy their studying experience and feel the 3Is (immersion, interactive, and imagination) of the 3D world (Hsiu-Mei, Ulrich, & Shu-Sheng, 2010).

In the following sections of this paper, we discuss the detail of framework and information for the PTBL learning model. First we introduce some related work and Web3D technologies; then we present the Problem and Task Based Learning model (ab. PTBL) and the reason for using Web3D technologies for this learning model; followed by a section that introduces several main tools in 3DVPP and demonstrates two case studies based on PTBL model within the 3DVPP system. In the we summarizes the results of the case studies.

RELATED WORK AND WEB3D TECHNOLOGIES

As mentioned above, there are many prevalent learning models, such as Problem Based Learning, Task-Based Learning, and some famous educational groupware systems like TeamWare
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