CoLeP: An Agent-based Collaborative System for Pervasive Learning

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Abstract

Collaborative learning is one of the intense topics from electronic learning (e-learning) to pervasive learning (p-learning) based on the diverse technology. This study attempts to shift the paradigm from e-learning to p-learning by combining pervasive computing technology. We consider students around the campus need to learn anytime anywhere except formal learning in the classroom. Consequently, this paper proposes an informal learning system called CoLeP to support pervasive learning. CoLeP system overcomes the existing learning problems such as learning in the fixed locations, teaching students accordingly with their aptitude, and interacting with limited devices. Finally, this work identifies three major contributions: (1) sharing knowledge immediately, (2) discussing collaboratively, and (3) learning anytime and anywhere.

Key Words- Collaborative learning system, pervasive environment, informal learning

1. Introduction

Collaborative learning is one of the intense topics from electronic learning (e-learning) to pervasive learning (p-learning) based on the diverse technology. Collaborative learning is a philosophy that provides the opportunity to assist people in working, brainstorming, and improving together. Collaborative learning signifies that learning is enhanced when it is more like a team effort than a solo race according to the definition of Gerdy (1998). It can be viewed as comprising two relatively independent cognitive systems which exchange messages; meanwhile, these two systems should merge to co-produce a shared understanding of the problem.

Good learning, is collaborative and social, not competitive and isolated sharing one's ideas and responding to others' improves thinking and deepens understanding. The shared learning gives people an opportunity to engage in discussion, take responsibility for their own learning, and become critical thinkers (Totten et. al., 1991). However, there are still problems that might occur in learning capability regardless of traditional learning or e-learning, such as (1) learning in the fixed locations (e.g., classroom for both for e-learning and traditional learning), (2) teaching students accordingly with their aptitude (e.g., different materials for both e-learning and traditional learning), (3) interacting with limited devices (e.g., PC for e-learning).

This study attempts to shift the paradigm from e-learning to p-learning by combining pervasive computing technology. Pervasive computing enables new applications which transform conventional notions to completely different concepts and redefine the significance of time and space. Particularly, pervasive learning is one of the important applications. Goh and Kinshuk (2006) identified several issues regarding pervasive learning that have not been yet exhaustively covered. Varied research uses different terminologies to discuss the applications in pervasive environment with similar strategies for contributing to the effort of coupling digital and physical world (Banavar et al., 2000; Lonsdale et al., 2004, Wellner et al., 1993). Even though technology is changing all aspects of our life such as sharing and development of knowledge; however, educators still tend to perceive leaning as the outcome of interaction between students, teacher and maybe textbooks.

Conversely, learning taking place in mobile uncontrolled environments is mostly informal. Informal learning describes a lifelong process whereby individuals acquire attitudes, values, skills and knowledge from daily experience, educative influences, and resources from family, neighbors, and so on (Conner, 2004). We consider students around the campus need to learn anytime anywhere except formal learning in the classroom. Consequently, this paper proposes an informal learning system called CoLeP to support pervasive learning. We also identified three major contributions for CoLeP system: (1) sharing knowledge immediately, (2) discussing collaboratively, and (3) learning anytime and anywhere.

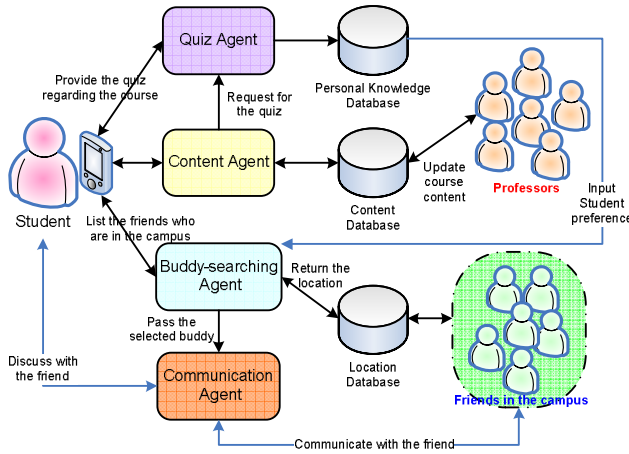## 2. System Framework

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Figure 1 System framework

This paper builds a collaborative learning system in pervasive environment called CoLeP. The applied collaborative learning concept assists the students in finding an appropriate classmate to discuss, share knowledge, and accomplish the short quiz collaboratively. CoLeP system enfolds four agents such as quiz agent (e.g., deliver the short quiz to the student), content agent (e.g., organize the course content), communication agent (e.g., communicate with his/her buddy), and buddy-searching agent (e.g., search the most appropriate nearby buddy). In addition, CoLeP system constructs three databases in order to store the student's behavior and all students' location information, and the materials of all courses given by professors. The detailed description will be demonstrated in the following sub-sections.

3. A case scenario

In this section, this work provides a case scenario from simulation (Figure 5). First, a student named Sam receives system's notification for course information. He decides "mobile commerce" to read the detailed materials, which is provided by the content agent. Theoretically, the professors update the course information to content database weekly. After Sam read the materials, CoLeP system notifies him to accomplish the quiz in the given time period.

Sam desires to make ensure the grade will be passed; therefore, he checks the friend list from his mobile device and finds his best friend John is online. He attempts to connect to John's mobile device through CoLeP system. Luckily, John agreed immediately and discuss with Sam collaboratively. In addition, Sam also can call John directly as long as he gives the name to CoLeP system. Particularly, if there are few friends on the list, Sam can add new friends directly in order to attain better searching results.

After discussing with John, Sam needs to accomplish a short quiz including five questions (i.e., four for testing and one for satisfaction). Finally, CoLeP system estimates

the learning score of the quiz and updates the satisfaction score to personal knowledge database. Sam knows the learning performance right away and decides to read the materials of other classes or not. That is, CoLeP system not only provides a real-time learning approach but a collaborative learning concept in the pervasive learning environment.
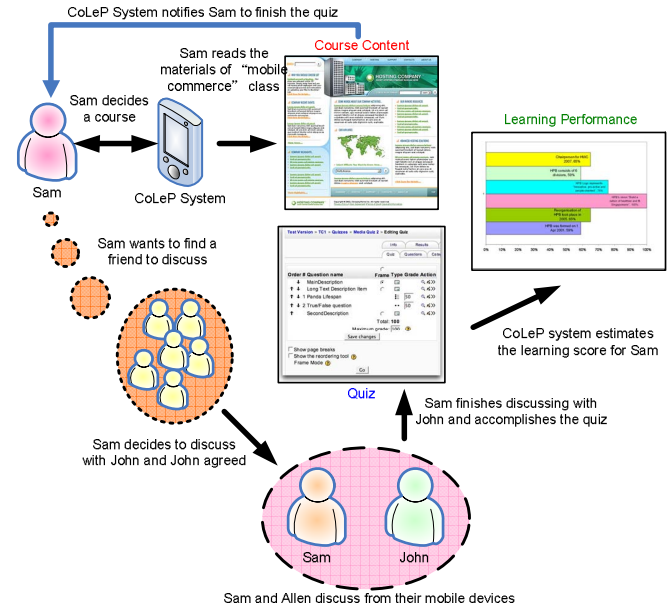

Figure 2 A case scenario

4. Conclusion

CoLeP system is a primitive work for informal learning in pervasive environment. The system enables the students to share knowledge by collaboration. The simulated results reveal that students may gain superior learning performance if they are willing to find a buddy to work collaboratively. That is, this work provides a platform for students to contribute themselves to their buddies in the campus. The students can learn anytime through the platform anywhere. This paper aims to assist a student in learning and sharing anytime anywhere. Furthermore, this work contributes to future research by implementing a proof-of-concept system: (1) sharing knowledge in the pervasive environment, (2) discussing and solving the problem collaboratively, and (3) providing a lifelong learning platform. Additionally, CoLeP system enables lifelong learning concept to be concrete and practicable. The present paper not only attempts to implement a prototype system in pervasive environment but also furnishes practicable concepts for knowledge sharing and learning collaboratively anytime and anywhere.