Designing an Asynchronous/Synchronous Combination Distance Learning Environment based on Web-BBS

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Abstract: This paper proposes a new distance education architecture to integrate both BBS and WWW features, is so-called IVC (Internet Virtual Classroom). This architecture has not only the traditional asynchronous characteristics of learning systems on WWW, but also synchronous interactions that traditional BBS service owned. This sort of learning environment can record and the learning flows of learners and analyze those collected data after a period time.
keywords: *Distance Learning, WWW, Client-Server, Synchronous, BBS.*

1. Distance Learning and Internet Virtual Classroom

This paper proposes an architecture that integrates not only both advantages of synchronous learning and asynchronous learning, but also several teaching and learning technologies, such as learning assistant, flow control, and evaluation model of problem solving *etc.* [CCH99][HHCH99][KHCH99]

2. System Modules of Internet Virtual Classroom

In this section, the components and characteristics of IVC will be analyzed. IVC has the synchronous learning and asynchronous model.

A. **System Administration:** group identification, flow control and data collection.
B. **Students' Support in IVC:** discussion, observation, competition learning, group learning, repeat learning and learning log collection.
C. **Teachers' Support in IVC:** design the teaching material, design the examination paper, plan learning path, answer learners' questions, analyze learners' learning behaviors.

3. IVC System Design

In this section, we will discuss the architecture of IVC. Each component must meet the requirements that has analyzed in the previous section.

A. **Client Layer:** multi-language support, users' identification, and web management console (includes web page management tools and teaching management tools).
B. **Server Layer:** three servers in IVC, including BBS server, Web server and Database server.
C. **System inner transactions:** four transactions existed in IVC, including IVC kernel and BBS, IVC kernel and Virtual Lab, IVC kernel and Data Center, IVC kernel and Agent.

4. Experiment System and Conclusions

An IVC experiment system is also implemented, named **IVC 21 Century** (http://ivc.cycu.edu.tw), which contains Department Office, Teaching Building, Science Experiment Center, Data Center and Conference Hall.

Figure 1. Web page manager tool in IVC

Figure 2. Flow control in IVC

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