Cooperative Learning in Operating Systems Laboratory

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ABSTRACT
In this paper, we describe the use of cooperative learning (with jigsaw) in lab sessions in an operating systems course.

Categories and Subject Descriptors

General Terms
Management, Experimentation.

Keywords
Cooperative learning, operating systems, laboratory exercises.

1. GOALS
The course of Operating Systems consists of 30 lecture hours and 30 lab hours. Students use several simulators in the lab sessions [2]. The goal is to develop specific skills about theoretical contents included in the Operating System course (processes scheduling, memory management and I/O system). We have found a difficulty in the development of these activities: the time needed to learn the simulators use is greater than the time spent on solving the lab exercise. Students did not read the tools instructions in deeply, they had difficulties to carry out the experiment and therefore they did not reach the specific skills. In order to solve this problem we have used cooperative learning, CL [1] to perform lab sessions.

2. APPLICATION
We scheduled four laboratory sessions for CL of Operating Systems concepts. Each session lasted 110 minutes. The lab instructor formed Ad Hoc groups of four students during each lab session. The students were assigned to groups randomly. In each session, the number of groups varied from 5 to 7. The first lab session was a training session, where the instructor showed to the students the jigsaw CL by means of a problem about POSIX system calls. The following three sessions the simulators were used. The simulator manual was divided in four parts, and a different part of the simulator manual was assigned to each member of the group. The proposed experiment only could be solved if all of the four members worked together sharing the individual knowledge about the simulator manual. The instructor gave 15 minutes to each member to read the assigned part of the manual. Later, the members met with other members which had assigned the same part of the manual. They met again in groups of four people. These groups are called “expert” groups. During 10 minutes, students met for discussing and solving doubts. Then, the groups turn to their initial configuration. During 5 minutes, each expert in a group taught the other group members about the information studied. After 20 minutes, the instructor gave the problem to be solved by the group. They had to solve it in 40 minutes. The problem solution needs information from the four experts. The last 25 minutes were destined to discuss and debate by students.

3. RESULTS
CL, used in lab sessions, got a favorable reception by students. The main benefits of this method are: (a) the sessions are self-contained; (b) new student groups were made up in every session, so students interacted with each other more than usually; (c) the last 25 minutes of each sessions constituted a platform for discussion, where students took part defending one’s own reasoning; (d) the time spent to lab sessions has been optimized. At the end of the term students completed a questionnaire in order to know their opinion on several issues of the subject. One of those questions was: “The CL methodology have consolidated and clarified my knowledge about the purpose of the session”. The 74.3% of the students agreed or well agreed with this assertion. We have reached the formative goals and we have favoured the development of transversal skills: group working, oral communication, synthesis capability and critical awareness.

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5. REFERENCES