Continuous Evaluation of Web-based Cooperative Learning: The Conception and Development of an Evaluation Toolkit

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ABSTRACT

In this paper we propose the concept of continuous evaluation, which combines existing evaluation approaches in the construction of an evaluation toolkit consisting of guidelines, methods and software tools for the monitoring, analysis and optimization of cooperative learning. The concept of continuous evaluation is interesting to those who wish to make systematic evaluations of CSCL systems. It describes those evaluation activities, which are appropriate when planning and designing CSCL, during early field studies, and throughout the ongoing maintenance of established courses. The aim of continuous evaluation is to build up a suite of evaluation methods and tools to be used by course organizers, authors, tutors and learners, which are tailored to a specific e-learning setting and are iteratively improved over time.

Keywords

Evaluation, quality assurance, cooperative learning, web-based learning, formative evaluation, data logging, participatory evaluation

THE CONTINUOUS EVALUATION APPROACH

The current explosion in the use of new web-based technologies to support cooperative learning brings many new challenges for those evaluating the effects of these new tools and methods on the learning process. Existing methods for the evaluation and quality assurance of CSCL systems, in particular criterion catalogues, have been heavily criticized for their lack of theoretical and empirical foundations (Fricke, 2000). Traditional evaluation approaches are not sufficient to tackle the evaluation of web-based cooperative learning. Evaluation in this area is difficult because many factors influence the cooperative learning process, which are always changing. This makes it necessary to make adjustments to the cooperative tools and learning methods to fit particular settings and emerging requirements. Therefore, there is a need to develop methods and tools for the formative evaluation of cooperative e-learning, which support course organizers, authors, tutors, learners (we call these the course 'stakeholders') to monitor and optimize their learning process at runtime. We should aim to provide sufficient information, so that they can reflect on their own activities and take effective action to improve their learning activities themselves.

We introduce our *continuous evaluation* approach to evaluating web-based cooperative learning in order to address the above needs and criticisms. This approach culminates in the construction of an evaluation toolkit (which we call the Quality Suite) consisting of guidelines, methods and software tools for the monitoring, analysis and optimization of cooperative learning. Drawing on established theories of cooperative learning we are creating models of learning that explain and predict the behavior of learners, tutors and learning groups with a particular technology in particular e-learning settings. Based on these models, we operationalize our evaluation measures in terms of specific behaviors, that are observable during the completion of a specific cooperative task. Via a series of laboratory and field evaluation activities, within representative e-learning settings, these models are being explored and tested. Thereby, the factors which contribute to effective learning are identified. The resulting Quality Suite provides methods and tools to support course stakeholders in their respective roles within these learning settings.

THE EVALUATION TOOLKIT

The evaluation toolkit (the Quality Suite) will consist of the following tightly interwoven three elements: Guidelines, Monitoring Tools and the Questionnaire Generator.

Guidelines for how to arrange effective cooperative learning will be used by the various stakeholders of the learning process in order to plan or improve their learning activities, to give new ideas for ways in which the tools can be used, to illustrate best practice examples and to support troubleshooting.

Secondly, we extend data logging methods, which have effectively been used to analyze online behavior in groups (Holmer and Streitz, 1999, in order to support the ongoing monitoring and optimization of learning at runtime. The *monitoring tools* will gather information about the learning process via both unobtrusive data logging and via brief online questionnaires that learners and tutors fill out at particular stages of the learning process. The questionnaires can be made to appear automatically after certain events (e.g. immediately after performing a cooperative activity). The data is then automatically

analyzed and made available in summarized form to course tutors, giving them a useful overview of how cooperative learning is taking place in individual cooperative exercises as well as across the whole course.

Thirdly, the *questionnaire generator* will help those evaluating a course to apply known quality criteria in order to generate questions about the learning process, which can be answered by the learners, giving feedback to the tutor about the course. The evaluator selects those quality criteria that are particularly relevant at the time, and the software selects appropriate, pre-defined questions from a database of quality criteria and an associated pool of questions. The questionnaires can also be used to enquire about critical incidents, which may have occurred.

EMPIRICAL FOUNDATIONS

The following three evaluation types are contributing to the empirical foundations of the quality suite:

The *Internal Evaluation of Cooperative Episodes* assesses the usability of tools and the utility of the cooperative activities independently of any specific course setting. Laboratory studies are used to predict the effects of particular features and cooperative learning methods on the learning process;

The *Evaluation of Course Effects* assesses the effect that cooperative episodes have on the ongoing learning process. In particular, we want to establish what effects the cooperative learning activities have on individual learning activities. We monitor changes in learner behavior immediately before cooperation (e.g. preparations that are made before taking part in a cooperative episode) and also afterwards (e.g. the reviewing activities of the learners after the cooperation is completed);

The *Investigation of Moderating Variables* investigates how other factors, such as learning style or type of content, interacts with the acceptance, appropriateness and effectiveness of particular types of cooperative learning activity.

STATUS

We are developing the Quality Suite in the ALBA project, which is almost one year underway at the time of publishing. We are cooperating closely with our partners (the German software company, SAP AG; and the vocational training institution, CJD Maximiliansau) in both corporate and public education settings to gather requirements for the Quality Suite. In a series of field studies, the toolkit will be developed, used, and iteratively improved. The L³ learning platform, is the test bed for many of our studies. The L³ project (Life Long Learning as a basic need) is a predecessor to ALBA, in which cooperative services for the L³ learning platform were conceptualized, developed, and evaluated (Wessner and Pfister, 2000).

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