

# Supporting Peer Learning with Ad-Hoc Communities

Johannes Konert<sup>1</sup>, Kristina Richter<sup>2</sup>, Stefan Göbel<sup>1</sup>, Ralf Steinmetz<sup>1</sup>, Regina Bruder<sup>2</sup>

<sup>1</sup>Department of Electrical Engineering and Information Technology, Multimedia Communication Lab, Working Group Serious Gaming, Rundeturmstraße 10, 64283 Darmstadt, Germany

{johannes.konert, stefan.goebel, ralf.steinmetz}@KOM.tu-darmstadt.de

<sup>2</sup>Department of Mathematics, Working Group Didactics of Mathematics, Schloßgartenstraße 7, 64289 Darmstadt, Germany  
{richter, bruder}@mathematik.tu-darmstadt.de

## ABSTRACT

Research in learning and competence development shows the benefits of peer support and access to peers' solutions for learning and understanding[1]. We propose a concept for task-focused knowledge exchange in a learner network using a digital learning environment that supports creation of ad-hoc (sub)communities by matching learning opportunities. Structural results from Social Network Analysis (SNA) are incorporated in the derived models of community-based learning in (sub)communities. The approach, research questions and the planned evaluation setup are described.

## Categories and Subject Descriptors

K.3.1 [Computer Uses in Education]: Computer-Assisted Instruction (CAI)

## General Terms

Algorithms, Measurement, Design, Experimentation, Human Factors.

## Keywords

Learning communities, peer reviews, knowledge sharing, ERGM.

## 1. MOTIVATION

As learning is a highly individual process, learning opportunities need to be provided appropriately. Computer technology may support this process, but cannot replace human interpretation and assessment – especially of open format questions[2], because here manifold strategic approaches and argumentations are possible. Learning opportunities arise here from two sides: First, assessment of such (existing) solutions can support consolidation of one's own understanding of the topic. Second, consuming the feedback that a second peer left on one's own solution can reveal (new) strategic knowledge and concepts for understanding[1]. Supporting this knowledge sharing in a computer-based learning environment opens new possibilities for the quality of blended learning. Especially for freshmen lectures of computer science (e.g. those dealing with maths) this approach provides loosely connected students with broad access to their fellows' knowledge - independent from time and place. With diagnostic design behind[2], and SNA[3] individual learning opportunities can be optimized and sub-clusters of the existing network can be formed (for learning).

## 2. APPROACH

Accompanying lectures, the software PEDALE consists of an authoring tool and an independent player tool, both connected to a

central content database. Without any programming skills, lecturers or educational professionals can setup the learning environments with test questions provided to students for practicing, diagnosis of their understanding and their solitary learning processes. The player component allows access to tasks and their solutions, which can be assessed. Assessment of one's own solutions from peers can be rated. The environment matches previous learning results (internal learner model) to learning opportunities (next tasks matching possible deficits). Solving similar tasks repeatedly allows the system to analyze the significant attributes of nodes in the underlying social network and multi-entity networks of existing knowledge (skill profile), accessed tasks, solutions and accomplished actions for maximization of learning efficiency.

## 3. RESEARCH THESES, EVALUATION

- (1) The access to peer heuristics in ad-hoc learning communities with PEDALE enhances learning processes.
- (2) PEDALE supports learners in becoming aware of their status of knowledge and abilities.
- (3) The establishing of (sub)-groups of learners with more effective learning outcomes in PEDALE using a peer matching algorithm based on relevant measures from the underlying (social) network structures leads to better learning outcomes.

The evaluation setup is planned to comprise interviews, pre- and posttests and continuous activity measuring (content access/provision, test question results) in order to generate exponential random graph models (ERGM or p\*) based on the significant attributes calculated with social network analysis (SNA). The accuracy of the models can then be shown by simulation.

## 4. REFERENCES

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