A Model of Collaborative Learning Scripts Instantiated with Mobile Technologies

Pierre Dillenbourg, Ecole Polytechnique Fédérale de Lausanne, Switzerland
Zeno Crivelli, Ecole Polytechnique Fédérale de Lausanne, Switzerland

ABSTRACT

Scripts are pedagogical methods for triggering productive interactions during computer-supported collaborative learning. SWISH is a pedagogical design model for constructing scripts: it articulates the nature of expected interactions to the nature of task division enforced by the script. This model is applied to mobile learning: different task divisions are supported by a distributed simulation environment, in which the client runs on mobile phones or PDAs. This contribution maps the computational architecture of the learning environment to a model of collaborative learning.

Keywords: CSCL; Pedagogical Model; Mobile Learning; Scripts

INTRODUCTION

Learning in groups is often more effective than learning alone, but not systematically (Johnson & Johnson, 1989). Teachers know that some groups interact intensively while other groups do not benefit from the same dynamics: sometimes, a team member works alone, another one doesn’t work at all, etc. This is why computer-supported collaborative learning (CSCL) is not simply about enabling collaboration at a distance but more specifically about designing environments in which collaborative learning is effective. Empirical studies revealed the difficulty of setting up conditions (e.g., group composition) that guarantee that the team works the way it ought to work (Dillenbourg, Baker, Blaye & O’Malley, 1996). The actual benefits of collaborative learning depend on the quality of the interactions that occur among group members. This problem led to the emergence of pedagogical methods, referred to as scripts, intended to trigger productive interactions. Scripts are pedagogical methods that structure collaboration by defining sequences of activities, by creating roles within groups and by con-
straining the mode of interaction among peers or between groups. A CSCL script is not very
different from a movie script: students as actors
will interact in a more or less constrained way.
Scripts were originally developed for face-to-
face situations (Aronson et al., 1978; O’Donnell
&Dansereau; 1992). To promote effective col-
laboration, a script aims to scaffold productive
interactions among peers. The main categories
of interactions that have been associated with
learning gains are argumentation/negotiation,
explanation and mutual regulation (student A
regulating the task actions of student B and
vice-versa).

The goal of this paper is to present a peda-
gogical model for designing CSCL scripts and to
describe how this model has been translated into
the computational architecture of a distributed
simulation running on mobile devices. This
contribution does not validate the pedagogical
model per se or its specific instance through
empirical studies; our purpose is to demonstrate
the articulation between the pedagogical model
and the technology. We first specify the scope
of our work, i.e. which type of CSCL scripts
we developed (Section 2) and how we consider
the role of mobile technologies (Section 3).
Then, we present the design model (section
4), the computational environment in which it
has been instantiated (section 5) and how the
model matches the environment and vice-versa
(section 6).

APPROACHES TO CSCL
SCRIPTS

We first clarify how our scripts differ from our
colleagues’ work. Researchers in CSCL have
developed micro-scripts and macro-scripts. On
the one hand, a script may scaffold argumenta-
tion by prompting these interactions. i.e. by
encouraging specific utterances. For instance,
some scripts display scaffolds such as “Please
provide counter-evidence to your partner’s state-
ment” (Weinberger, Fischer & Mandl, 2002).
On the other hand, the ArgueGraph script (see
below) induces argumentation by forming pairs
of students with conflicting opinions. The first
approach constitutes a conversational script,
also called a micro-script, while the second
approach, which sequences learning activities,
is referred to as a macro-script (Dillenbourg &
Jermann, 2007). Micro-scripts constitute the
objective of the learning session - the students
are expected to internalize a model of well-
formed argumentation - while macro-scripts are
pedagogical methods, to be acted and forgotten.
Micro-scripts reflect a cognitive psychology
approach: they zoom in on the collaborative
processes. Macro-scripts rather reflect an edu-
cational science perspective: they are applied
for designing learning activities in real educa-
tional contexts. This contribution focuses on
macro-scripts. We illustrate our approach with
two examples of macro-scripts that are briefly
described below. A longer description can be
found in Dillenbourg & Jermann (2007) and
Dillenbourg & Hong (2008). We then describe
the underlying pedagogical model, which can
be applied to design many new scripts.

The first example of a script, ArgueGraph
(Jermann & Dillenbourg, 1999), aims at trig-
ergating argumentation between pair members.
It includes 5 phases.

1. Each student takes a quiz on-line. The
questions have no correct or incorrect an-
swer; students’ answers reflect their own
theories about learning. For each choice,
the students justify their choices by typing
comments into a free-text entry zone.

2. The system produces a simple graph in
which students are positioned according
to their answers. The graph is displayed
to the whole class and discussed by the
teacher, The students react to this social
map, which amplifies the social dynamics
in the class. The system or the tutor forms
pairs of students by selecting peers with
the greatest distance between them on the
graph (i.e., those with the most different
opinions).

3. Pairs answer the same questionnaire as in
phase 1 together, and again provide some
justification for their choices.
Related Content

iTE: Student Teachers using iPad on a Second Level Initial Teacher Education Programme
[www.irma-international.org/article/ite/152272/](http://www.irma-international.org/article/ite/152272/)

Presence and Perceived Learning in Different Higher Education Blended Learning Environments
[www.irma-international.org/article/presence-and-perceived-learning-in-different-higher-education-blended-learning-environments/129515/](http://www.irma-international.org/article/presence-and-perceived-learning-in-different-higher-education-blended-learning-environments/129515/)

Reciprocal Mentoring "In The Wild": A Retrospective, Comparative Case Study of ICT Teacher Professional Development
[www.irma-international.org/chapter/reciprocal-mentoring-wild/9199/](http://www.irma-international.org/chapter/reciprocal-mentoring-wild/9199/)

Learner-Interface Interactions with Mobile-Assisted Learning in Mathematics: Effects on and Relationship with Mathematics Performance
Use of Mobile Applications for Hospital Discharge Letters: Improving Handover at Point of Practice