Chapter 15

EDUCATIONAL PERSPECTIVES ON SCRIPTING CSCL

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Abstract: This chapter discusses different educational approaches to collaboration scripts. When carefully designed, scripts can push learners to that kind of situations in which meaningful interaction can take place. However, many conditions need to be met for this to happen in authentic classroom contexts. One of the biggest educational challenges in instructional design of computer-supported collaboration scripts is to better integrate them into wider social planes such as overall classroom activities. Scripts could also be considered as contextual and situated resources in collaborative learning environments. Furthermore, a challenge for future research is to explore how external scripts can be gradually replaced by individual self-regulation. In order to face many of these challenges, longer-term follow-up studies should be conducted in research on collaboration scripts.

1.   INTRODUCTION

The use of online learning environments has increased in different educational settings. The problem has been that simply offering online learning environments for student use does not guarantee that they will interact in a way that promotes learning. Also, teachers in the field need pedagogical guidance to use new learning environments. For example, the research done recently in four Scandinavian countries reveals that of the two thirds of the teachers who have received ICT training, only one third of them felt qualified to use ICT in their teaching (E-Learning Nordic, 2006).

At the same time, increasing interest in research on collaborative learning, particularly in computer-supported settings, has provided knowledge that can guide and support student interaction and collaboration. Through scripting, learners would convey an introduction to the activities that they would not otherwise engage in on their own. Scripts have proved to be a

valuable approach to facilitate specific forms of interaction and collaborative activities in online learning environments, which can promote different kinds of learning objectives without compromising the idea of self-guided learning (e.g., Dillenbourg, 2002; Weinberger, Ertl, Fischer, & Mandl, 2005).

The basis of the research on collaboration scripts, as also represented in this book, is the integration of different sciences - cognitive psychology, computer science and educational science - which makes the theoretical background stronger than what would be represented by only one discipline (Fischer, Wecker, Schrader, Gerjets, & Hesse, 2005). The role of educational science is to offer practical insights into exploring the use of scripts in real-life educational settings. In addition, there are pedagogical challenges we will face when implementing scripts into practical educational settings. The articles in this section deal with the design principles and effects of collaboration scripts. Further, they raise several questions related to pedagogical challenges, as well as to methodological questions of studying scripted collaboration.

2.   DIFFERENT NOTIONS OF SCRIPTING

Collaboration scripts comprise a number of rules, which describe the way in which learners should interact with each other and collaborate on a task (O'Donnell & Dansereau, 1992). Specifying learners' collaboration processes through scripts is intended to help learners to enter into activities that serve productive interaction and collaborative knowledge construction. Scripts are meant to assign actions in such a way that all learners will carry out in turn the action specified or perform a predefined series of specified actions (Weinberger, 2003). Scripts also provide collaborative learners with a complex set of instructions detailing several goal dimensions, for example, supporting meta-cognitive and elaborative activities or fostering epistemic activities or social processes in particular. Subsequently, scripts aim to enhance the probability of productive interactions.

Recent research on collaboration scripts has made a distinction between macro- and micro-scripts (Dillenbourg & Jermann, this volume; Kobbe, Weinberger, Dillenbourg, Harrer, Hämäläinen, & Fischer, 2006). Micro-scripts lean more toward a psychological, process-oriented perspective, whereas macro-scripts are based on an educational perspective that influences the process more indirectly. According to Dillenbourg and Jermann (this volume), a micro-script scaffolds the interaction process per se by providing sentence starters, question prompts or descriptions. A macro-script, on the other hand, sets up conditions in which favourable activities and productive interaction should occur. Macro-scripting targets to push learners to

engage in those kinds of activities that promote interaction, but no specific support, for example, on how learners should interact is given. Compared to micro-scripts, macro-scripts also typically describe longer time segments and are spread over more social planes, emphasizing the orchestration of activities within the classroom. In this section of the book, the scripts presented in the articles by Weinberger, Stegmann, Fischer, and Mandl, as well as by Ertl, Kopp, and Mandl, more or less represent micro-scripting. The script presented in the article by Kolodner, on the other hand, represents macro-scripting.

Kolodner's study was conducted in face-to-face situations as a long-term study in authentic classrooms. Her article describes how scripts can help to integrate aspects of interaction and make them suitable for use in educational settings. According to Kolodner, it is important that learners garner various experiences when participating in the kinds of practices and activities, such as observing, repeating and reflecting, which enhance their membership and active learner role in the scientific community. It is not enough to just promote certain kinds of discourse. Learners also need to have a good reason for discourse, and classroom scripting can be matched with different discourse needs (see also ArgueGraph; Dillenbourg & Jermann, this volume). The Learning by Design model presented by Kolodner is in many ways different from the scripts presented in the other two chapters in this section. The LBD model represents macro-scripting involving some micro-scripting (prompts, coaching). This macro-scripting provides the reasons for learners to participate in productive discourse with their fellow learners in the LBD model. Although reporting better participation in scientific activity in the Kolodner's study, the learning outcomes were not reported. This will raise a question as to whether different learners learned the content better than without the LBD model.

In the study by Weinberger and his colleagues, the university students solved three cases using the attribution theory in the online learning environment. The results show that when supporting students' social interaction, their interaction was not only more productive and meaningful, but also their epistemic activities were enhanced. It might be interesting to see analyses on how the students proceed from one case to another, whether they develop their own scripts regardless of the scripts which were given, and whether these groups get better when solving the second and the third case. Also, repeating the same activities might provide a clue as to whether the learners adopted these scripts or created scripts suitable for the particular group as in Kolodner's studies. Planning a long-term study, where the same students solve different tasks, might help to determine whether these scripts will be adopted and whether students can transfer these scripts into different situa-

tions. This way we could also explore how students use the scripts as situated resources of the learning context (see also Stahl, this volume).

In the study by Ertl, Kopp, and Mandl, the content schemes were effective in both of their studies. In their first study, the scheme was effective in terms of collaborative learning outcomes, whereas, in the second study, it has a positive effect on both collaborative and individual learning outcomes. One of the basic ideas behind collaborative learning is that groups should perform better and produce something greater than individuals alone could perform or produce. This study has been able to find a way to support groups to collaborate in such a way that they are successful as a group. Further questions in this line of research might be: Are collaboration scripts as useful in videoconferencing as in face-to-face situations without training and without reflection? This particular study was a short-term study, whereas repeating and using the same guidelines several times might give different results and might help learners to internalize scripts.

To sum up all the three studies in this section, it seems evident that with regard to collaborative learning, it is important to support not only the content, but also the social level of interaction (see Barron, 2003). It seems that learners face a dual-problem space of this kind as they are supposed to work and learn collaboratively. Crucial problems concerning interaction in different educational settings can emerge in the relational space, that is, at the social and emotional levels of collaboration. In Kolodner's LBD cycles, there are two types of classroom scripts represented: action and discourse. Action-based activities (e.g., designing an experiment) are associated with skills and practices of science and design, they happen in small groups, and they provide context for discourse. Discourse activities, on the other hand, have discourse as a major activity, and they sequence and specify who has the floor and what the content of discussions is. Weinberger and colleagues differentiate between three process dimensions: epistemic dimensions, referring to arguments as steps towards solving the learning tasks, an argument dimension, referring to formal criteria for solving the learning task, and a dimension of social modes of co-construction, referring to how learners interact with each other. Ertl and colleagues talk about content schemes as content-specific support and task-specific support as collaboration scripts.

Altogether, there is growing evidence that learning in collaborative environments cannot be explained as constituting only the result of specific abilities, but appears as the product of complex and dynamic interactions between cognitive, social, affective and motivational variables (Pintrich, Marx, & Boyle, 1993). What is needed now is to better understand how individuals' mental processes relate to social and situational factors that influence cognitive performance and learning. Furthermore, the activities in-

volved in collaborative learning are much more complicated than what outcomes alone reveal (see also Dochy, 2005).

3.   METHODOLOGICAL CHALLENGES

The studies in this section also raised several methodological questions and challenges. While seeking methodological accounts for capturing, e.g. the processes of collaborative learning or scripted collaboration, we should bear in mind that the analysis of collaborative interaction cannot be isolated from the context in which it is embedded (Crook, 2000). To find out more about the nature of collaborative learning processes and what promotes collaborative knowledge building, different features affecting learning must be studied in the context of the joint activity, i.e. with relation to and in the form they occur in different learning environments. Furthermore, it is also important to develop methods for identifying how scripts are used as situated or contextual resources as suggested earlier. Consequently, new methods are needed to capture the process of collaborative interaction and its contribution to learning.

Altogether this requires longer term follow-up studies with the same groups, not just analysis of short episodes of interaction. We should move towards micro-level analysis of interaction in the study of scripted collaboration. The long-term follow-up studies could enlighten, for example, whether scripts can be faded out in order to see if learners adjust their techniques when there are no longer scripts to guide them. However, this demands that group processes are followed in running time in order to trace these problems learners are facing.

4.   DESIGN ISSUES AND PEDAGOGICAL CHALLENGES

One of the crucial questions from the perspective of educational research is the impact of basic research. How can the research on collaboration scripts inform us in developing pedagogical practice? And what are the biggest challenges in designing and implementing scripted collaboration, such as presented by the authors in this book, for authentic learning environments?

A notably challenging task is to transfer the implications of research projects out into the field. One of the challenges therein is to modify and revise the existing practices to form a new culture of schooling. Stahl (2005) puts forth an interesting idea about a theoretical confusion between learning and group knowledge. This can be seen as a barrier to both educational

practice and educational research. Learners, teachers and researchers have a tendency to see learning as an individual attribute, failing to grasp the true potential of collaborative learning, as they lack awareness that groups can construct knowledge together in a way that is impossible for single learners and that group learning can subsequently enhance individual learning (Stahl, 2005).

Teachers need instructional strategies when introducing classroom scripts, as well as promoting reflection and articulation of their sequencing, purposes, variations, etc. In some of the studies, students repeat the problem solving task three times (for example, Weinberger et al., this volume), but they do not reflect on what they were doing and why and how. Therefore, they might have problems in transferring the scripts into different situations. Kolodner described in her article that when repeating and afterwards re-flecting on these activities and practices, collaborators became more in-volved in participating in the activities and discourse. The quality of partici-pation and discourse also increased. According to Kolodner, classroom scripts and instructional strategies need to include opportunities for small-group as well as public (whole-class/large group) practice.

From the instructional design perspective, scripts should allow flexible mobility between different social planes (individual – group – classroom). According to Dillenbourg (2002), the effectiveness of scripts is based on the idea of integrating usually separate activities: individual, cooperative, col-laborative and collective activities. Furthermore, scripts enable the integra-tion of co-present activities and computer-mediated activities. They also in-troduce a time frame in distance education where students often lack land-marks for their time management. The other side of the coin in designing well-defined scripts is the risk of over-scripting collaboration. Predefined scripts can disturb the richness of natural interaction and problem solving processes. Furthermore, this kind of "educational engineering" approach can lead to striving for effectiveness at the cost of the genuine notion of collabo-rative learning. The balance between the benefits and risks of structuring collaboration depends on the core mechanism that the script is based on, in other words, how the designer or teacher aims to foster productive interac-tions and learning.

What has not been studied much yet is how teachers adopt the use of scripts or how their own role and conceptions of learning fit with the ones represented by scripting. Can the use of scripts even create a conflict in a classroom regarding the role of teacher? This definitely depends on whom the scripts are designed by. Therefore, one of the crucial questions is how to facilitate the teachers' design and use of collaboration scripts. One option suggested by European Research Team CoSSICLE ("Computer-Supported Scripting of Interaction in Collaborative Learning Environments"; funded by

the Kaleidoscope Network of Excellence) is to develop tools to help in designing collaboration scripts. Compared to any authoring tool, the idea behind these tools should be to make pedagogical rationale behind the scripts explicit.

5.   CONCLUSIONS

It is evident, also on the basis of the studies presented in this book, that scripted collaboration does not happen without problems and challenges. Different groups will act differently regardless of the same instructional interventions and environments. Therefore, the question arises whether scripts allow enough freedom for the group members to choose the best way for them as a group to collaborate and learn together. In the design of collaboration scripts, we often refer to so-called "ideal scripts", whereas *actual* scripts are the ones that tell us what really happens and emerges in interaction situations. Furthermore, we should consider what other scripts may already be operating in the learners' mind(s) or in the learning environment (internal scripts & external scripts; see Kollar, Fischer, & Slotta, 2005). Learners have learned particular interaction patterns in everyday situations or in educational situations, which they try to transfer to, e.g. collaborative learning situations. However, learners might be unfamiliar with collaborative learning situations, and therefore, may fail to use skills and knowledge, which they already possess, in daily situations that enable them to collaborate.

Weinberger and colleagues raise an important challenge for the future research of CSCL environments. Namely, we should focus on how scripts can be designed not to substitute, but to facilitate discourse and cognitive activities related to individual knowledge acquisition. There is also a need to investigate the interaction of different script components that may be adapted to the already existing internal scripts. Internal scripts can play a crucial role, i.e., when using scripts for videoconferencing like in the study by Ertl and colleagues. Using the same guideline several times in videoconferencing scenarios may encourage learners to internalize it as a script. And, after a time, this internalized script may be able to support learners as suggested by Schank and Abelson (1977). Also, Kolodner emphasizes that while one can design sequences of events or activities to be used as scripts, it is important to remember that their use will depend on how well they are learned as scripts. Therefore, one of the most crucial questions here is how external scripts can gradually be replaced by individual self-regulation.

Based on the three different studies highlighted in this section, certain kinds of scripts do enhance learner interaction in a meaningful and productive way with regard to collaborative learning. However, learners will not

interact with each other in a productive way, if there is not a good reason for it. Therefore, an authentic need for collaboration as suggested by Kolodner is required. For example, in the LBD model, effective collaboration is always about something, namely, LBD aims to encourage the learning of the reasoning that needs to be done collaboratively. With scripts, learners can be guided to the kind of situation where learners need to interact with each other and support each other to interact meaningfully.

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