Effects of the Discussion Script on Argumentation-Based Computer Supported Collaborative Learning

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Introduction

Engaging learners in dialogical argumentation is an educational approach for preparing learners to manage today's complex issues. In dialogical argumentation, learning partners collectively contribute reasons and evidence from different viewpoints in order to build up a shared understanding of the issue at stake with the goal of learning. In the learning sciences, this collective exploration of the dialogical space of solutions is considered as an important approach to foster argumentative knowledge construction (Stegmann et al., 2007 & in press). In argumentative knowledge construction, learners are supposed to build arguments and support a position, to consider and weigh arguments and counter-arguments, to test, enlighten, and clarify their uncertainties, to elaborate on the learning materials, and thus acquire knowledge and achieve understanding about complex ill-structured problems. Computer-Supported Collaborative Learning (CSCL) settings in which learners argue in teams have been designed to facilitate representing, constructing, and sharing of arguments in multiple formats (see Noroozi & Biemans et al., 2011 & 2012; Noroozi & Busstra et al., 2012; Noroozi & Weinberger et al., in press). Various forms of collaboration scripts have been designed to facilitate particular process categories of argumentative knowledge construction such as the construction of single arguments by supporting learners to warrant their claims as well as the construction of argumentation sequences by supporting learners in following specific argumentation sequences e.g. argument, counterargument, integration etc. (see Stegmann et al., 2007; Weinberger & Fischer, 2006). In spite of positive effects of these scripts on the discourse activities they were directed at and also on the acquisition of knowledge on argumentation, not all of them facilitated the acquisition of domain-specific knowledge (see Kollar et al., 2007; Stegmann et al., 2007). The reason is that these scripts demand learners to allocate a considerable part of their cognitive capacity to argumentation and hence little cognitive effort and time could be allocated to joint elaboration of the learning materials, additional resources, external memories and contributions of the learning partners for enhanced domain-specific knowledge acquisition (Stegmann et al., 2007 & 2012). This is striking since there is evidence showing that cognitive elaboration of the learning materials is positively related to knowledge acquisition (see Stegmann et al., 2012). Facilitating argumentative knowledge construction may, therefore, not only be a question of how to support process categories of argumentative discourse activities, but also a question of how to foster elaboration of the learning materials for enhanced domain-specific knowledge acquisition. This study thus investigates how scripts can be designed in a transactive manner to facilitate both argumentative discourse activities and domain-specific knowledge acquisition in a multidisciplinary CSCL setting. In addition, the extent to which this transactive discussion script influenced learners' knowledge on argumentation was studied.

Keywords: argumentative knowledge construction; collaborative learning; computer-supported collaborative learning; multidisciplinary groups; transactive discussion script

METHOD

The study took place at Wageningen University (N=60). The subject was the concept of "Community-Based Social Marketing (CBSM) and its application in Sustainable Agricultural Water Management (SAWM). The task was to apply the concept of CBSM for fostering SAWM. Learners were first asked to individually design an effective plan for problem case. Then, collaborative learning phase took place. Then, learners were asked to individually work on an identical case-based assignment. As a transactive discussion script, four types of prompts were embedded into the reply messages in text windows, each of which was expected to facilitate various process categories of argumentative knowledge construction (Berkowitz & Gibbs, 1983). These included prompts for 1- argumentation analysis; 2- feedback analysis; 3- extension of the argument; 4- building counter-arguments and interactive arguments.

We used discourse corpora to assess argumentative structure. Following Weinberger and Fischer (2006), we counted number of supported, limited or/and both claims as indicator of quality of single arguments. Following Leitão (2000), we counted number of transitions from argument to counterargument, counterargument to integration, and integration to counterargument as indicator of quality of argumentation sequences. Both group and individual learning performance was assessed on the basis of expert solutions.

RESULTS

The preliminary results showed that the transactive discussion script not only facilitates argumentative discourse activities but also collaborative knowledge construction. Furthermore, it improves individual domain-specific and argumentative knowledge acquisition. Based on this study, the general conclusion can be drawn that not only scripts for construction of one's own single arguments and exchanging them in argumentation sequences can foster the construction of single arguments and argumentation sequences (see Kollar et al., 2007; Stegmann et al., 2007 & 2012) but also the scripts for analysis and evaluation of learning partners' arguments and exchanging them in dialogic-sequential argumentation in a multidisciplinary CSCL setting. Furthermore, these argumentative discourse activities followed by peer clarifications and elaborations of the learning materials enhance learners' knowledge on argumentation as well as both individual and group learning performance. In this regard, group performance referred to how well learners collaboratively co-constructed knowledge during discourse activities. Individual performance referred to how well learners individually applied their own and learning partner' knowledge in an identical problem case while analysing and designing solution plan for fostering sustainable behaviour in a multidisciplinary setting.

REFERENCES

Berkowitz, M.W., & Gibbs, J.C. (1983). Measuring the developmental features of moral discussion. *Merrill-Palmer Quarterly, 29*(4), 399-410.

Kollar, I., Fischer, F., Slotta, D.J. (2007). Internal and external scripts in computer-supported collaborative inquiry learning. *Learning and Instruction, 17*(6), 708-721.

Leitão, S. (2000). The potential of argument in knowledge building. *Human Development, 43*(6), 332-360.

Noroozi, O., Biemans, H.J.A., Busstra, M.C., Mulder, M., & Chizari, M. (2011). Differences in learning processes between successful and less successful students in computer-supported collaborative learning in the field of human nutrition and health. *Computers in Human Behavior, 27*(1), 309-318.

Noroozi, O., Biemans, H.J.A., Busstra, M.C., Mulder, M., Popov, V., & Chizari, M. (2012). Effects of the Drewlite CSCL platform on students' learning outcomes. In Juan, A., Daradoumis, T., Roca, M., Grasman, S. E., & Faulin, J. (Eds.), *Collaborative and Distributed E-Research: Innovations in Technologies, Strategies and Applications (pp. 276-289).* IGI Global.

Noroozi, O., Busstra, M.C., Mulder, M., Biemans, H.J.A., Geelen, M.M.E.E., van't Veer, P. & Chizari, M. (in press). Online discussion compensates for suboptimal timing of supportive information presentation in a digitally supported learning environment. Educational *Technology Research & Development, 60(2), 193-221*.

Noroozi, O., Weinberger., Biemans, H.J.A., Mulder, M., & Chizari, M. (in press). Argumentation-based computer supported collaborative learning (ABCSCL). A systematic review and synthesis of fifteen years of research. *Educational Research Review*. doi: 10.1016/j.edurev.2011.11.006.

Stegmann, K., Weinberger, A., & Fischer, F. (2007). Facilitating argumentative knowledge construction with computer-supported collaboration scripts. *International Journal of Computer-Supported Collaborative Learning, 2*(4), 421-447.

Stegmann, K., Wecker, C., Weinberger, A., & Fischer, F. (in press). Collaborative argumentation and cognitive processing in computer-supported collaborative learning environment. *Instructional Science, 40(2), 297-323.*

Weinberger, A., & Fischer, F. (2006). A framework to analyze argumentative knowledge construction in computer-supported collaborative learning. *Computers and Education, 46*(1), 71-95.