Leveraging social networking sites for knowledge co-construction: Positive effects of argumentation structure, but premature knowledge consolidation after individual preparation

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ABSTRACT

Social Network Sites (SNS) like Facebook bear potential for collaboration through rich social interactions, but the shared arguments are often poorly elaborated, and lack epistemic quality. In a controlled 2×2 study ($N = 128$), we investigated how individual preparation and argumentation scripts can support argumentative knowledge co-construction in Facebook. Individual preparation has been shown to motivate participants, activate prior knowledge, reduce process losses and promote unbiased arguments. Argumentation scripts can support quality of argumentative discussions and evidence-based argumentation. Their combination may, thus, enhance the argumentation quality in SNS interactions and facilitate domain knowledge acquisition. We found negative effects of individual preparation, ascribable to lack of knowledge co-construction and knowledge convergence, that point to knowledge consolidation. Scripting argumentation has some positive effects, but not in combination with individual preparation. We identify possibilities and risks of applying standard collaborative learning instructions in the context of SNS, and discuss theoretical consequences.

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1. Learning in social networking sites

Facebook and other SNS offer unique opportunities for building social rapport and engaging in dynamic conversations often missing from standard web-based but purpose-specific learning environments. SNS are considered an authentic context for social and informal learning (Greenhow & Robelia, 2009; Greenhow, 2008). Contrary to known inhibitions to participate and volunteer one's opinion to the discussion in formal learning environments — contributions are thought to be warranted for those who know the right answers and may think of themselves as legitimate speakers (Clarke, 2015), discussants in SNS openly share information and volunteer diverse opinions and attitudes in a highly involved and emotional manner (Greenhow & Robelia, 2009; Greenhow, 2008).

According to approaches of AKC[1] (Asterhan & Schwarz, 2016; Weinberger & Fischer, 2006), online discussions in SNS can create learning opportunities. Empirical studies have found that SNS can promote information sharing and learning (Dabner, 2011; Laru, Näykki, & Järvelä, 2011) and SNS interaction bear social affordances related to learning: they may foster social aspects of academic life including actual friendships (Bennett, 2010; Pempek, Yermolayeva, & Calvert, 2009; Ryan, Magro, & Sharp, 2011; Selwyn, 2009), enable the exchange of study-related knowledge (Wodzicki, Schwämmlein, & Moskaliuk, 2012), and active information seeking (Lampe, Vitak, Gray, & Ellison, 2012). Still, it remains unclear under which conditions such socio-cognitive affordances of SNS can be leveraged for academic purposes.

AKC provides a theoretical framework for supporting learning through dynamic argumentative discussions in SNS. AKC is the deliberate practice of elaborating learning material and discussion topics by constructing formally and semantically sound arguments with the goal of gaining argumentative and domain knowledge (Asterhan & Schwarz, 2016; Weinberger & Fischer, 2006). Communication media have brought AKC to the stage of educational research in the last years. There is interest in facilitating skills of argumentation to allow for participation in discussions of a

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[1] AKC: argumentative knowledge construction.

democratic society (Asterhan & Schwarz, 2016). Since SNS are a communication medium designed for social exchange and dialogue-based interaction and offer a rich social context of interaction they may be especially suitable for collaborative AKC given the right support (Iordanou & Constantinou, 2014; Weinberger, Stegmann, Fischer, & Mandl, 2007). AKC has been investigated in the context of CSCL[2] due to its theorized added value for individual but also group level knowledge outcomes in line with social theories of learning. AKC strongly builds on learners' argumentation skills. Argumentation skills are necessary to critically process information and participate in civic life, but are lacking even in higher education (Marttunen & Laurinen, 2001). SNS may also technologically support quality of argumentative routines that are important for AKC and help with their per design social characteristics to add back the social aspects of AKC. This cannot always be taken for granted in standard CSCL learning environments, but is a prerequisite for unravelling argumentation skills and leading to knowledge gains (Asterhan & Schwarz, 2016; Kuhn, Zillmer, Crowell, & Zavala, 2013; Paglieri, 2016).

The dynamic conversations and diversity of opinions together with their emotional expression hold promise for knowledge co-construction (Lave & Wenger, 1991; Vygotsky, 1978). In order to capitalise on learning opportunities, learners need to analyse diverse views, understand conceptual principles, and attain to socio-cognitive norms of elaborative and metacognitive strategies (Kuhn et al., 2013; Nussbaum, 2008). Airing one's positions and the supportive arguments make them transparent to oneself and the collocutors and open to scrutiny. Collaborative argumentation acts motivationally to visiting multiple perspectives and submitting them for discussion, while collocutors attempt to persuade each other and justify their arguments. When collaboratively discussing about one topic learners are not able to just build their own opinions and hang on to them, because the possibly contradicting arguments of other learners also demand attention. This may enhance motivation of the single learner to cope with different perspectives and arguments than only his own. It also involves a search for and deliberate use of evidence in the domain that can be thus actively processed and learned (Asterhan & Schwarz, 2016; Nussbaum, 2008). Especially deliberative argumentation that aims at agreement between the collocutors can foster productive conversation moves, less conflict orientation and rather epistemic-oriented critical reasoning (Asterhan & Babichenko, 2015; Felton, Crowell, & Liu, 2015; Felton, Garcia-Mila, & Gilabert, 2009).

Despite the potential affordances of SNS for AKC, argumentation in online discussions is often of low quality. Conflicting opinions and inconsistencies tend to be dismissed rather than critically assessed in online communication and the quality of the emergent knowledge in this context is questionable (Kanuka & Anderson, 1998). Research has also shown that computer-mediated communication as exemplified in SNS may emphasize private self-awareness (Matheson & Zanna, 1990), learners tend to disregard alternative perspectives when individual identity is salient (Sassenberg & Boos, 2003), and confirmation bias disallows learners to process equally convincing arguments that represent alternative perspectives and are generated by non-group members (Mackie, Worth, & Asuncion, 1990). Similarly, SNS are platforms for primarily asynchronous social interaction consisting of individual actions, like preparing and posting arguments or liking other contributions. Hence, asynchronous discussions allow participants to search for evidence and construct sound arguments in their own time. However, the effects of individually preparing arguments on learning remain unclear. Individual preparation might rather

wrongly put the focus on self-presentation, both in classroom discussions (Clarke, 2015) and, especially, in computer-mediated communication (Wodzicki et al., 2012) and away from analyzing discussion topics together.

How can we leverage the potential of asynchronous SNS for AKC? Individual preparation time may suffice to support construction of sound arguments that are well thought-through and unbiased by the group. Additionally fostering the formal quality of argumentative discussions may help making the most of individual and joint construction of arguments. Alternatively, individually preparing arguments may hinder knowledge co-construction and promote an individualistic approach to learning that does not align with AKC. Argumentation scripts may impose too much structure in the form of principles of quality of argumentative discussions and disrupt the rich context of interactions.

Here, we investigate how the social networking site Facebook may serve as a learning platform and how such instructional designs, namely, individual preparation of arguments and argumentation scripts, can be leveraged to this end.

1.1. Argumentation scripts

Argumentation scripts may support learners in co-constructing knowledge in CSCL scenarios (Noroozi, Weinberger, Biemans, Mulder, & Chizari, (2012); Scheuer, Loll, Pinkwart, & McLaren, 2010). Scripts are used to guide and structure discussions in order to help discussants clarify their own ideas for themselves and consider new ideas by others through argumentation, thus enhancing knowledge co-construction (Andriessen, 2006; Andriessen, Baker, & Suthers, 2003; Fischer, Kollar, Stegmann, & Wecker, 2013; Kollar, Fischer, & Hesse, 2006; Weinberger, Stegmann, Fischer, et al., 2007). Scripts can activate existing internal scripts or help create new scripts by organizing dispersed internally represented elements (Fischer et al., 2013). Scripts often enhance knowledge co-construction through argument elaboration (e. g. Fischer et al., 2013; Stegmann, Wecker, Weinberger, & Fischer, 2012; Weinberger, Stegmann, & Fischer, 2010), while peer-monitoring can foster the application of scripts when fading them to allow more self-regulation (Wecker & Fischer, 2011). Argumentation scripts can be implemented with relatively simple means: prompts or sentence openers can guide learners to warrant their claims or to construct counterarguments, which aims to help learners elaborate their arguments, consider multiple perspectives, gain argumentative knowledge (Weinberger et al., 2010) and resolve conflicts productively (Andriessen, 2006; Baker, 2003; Belland, Glazewski, & Richardson, 2008). Scripts may alleviate process losses related to searching an appropriate structure, that can then foster simultaneous processing of the partner's ideas (Wang, Rose, & Chang, 2011). Despite these positive effects, there has not been a consistent body of findings on domain knowledge outcomes from argumentation scripts. Argumentation skills are promoted by technology-enhanced instructional approaches, but no substantial effects on domain-specific knowledge have been shown in a meta-analysis (Wecker & Fischer, 2014). Moreover, there is still very little research on argumentation scripts in SNS. While scripts have been found to be an appropriate and efficient way of structuring and enhancing learning processes and partially outcomes in purpose specific technologically enhanced learning settings, little is known about their effects in social networks. Potentially, scripts may overly restrict interaction. Over-scripting has been argued to hamper spontaneous collaboration flow and result in reduced or hindered interaction (Dillenbourg, 2002; Tsovaltzi, et al., 2010). In SNS, hindering spontaneous interactions might reflect strongly on learning as it may cancel its theoretical advantage for collaborative learning: the otherwise rich context of

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[2] Computer-Supported Collaborative Learning.