Is there evidence for expertise on collaboration and if so, is it domain-specific or domain-general?

Jan Kiesewetter, Lehrstuhl für Didaktik und Ausbildungsforschung in der Medizin, Ziemssenstraße 1, 80336 München, Germany, jan.kiesewetter@med.lmu.de
Martin R. Fischer, Lehrstuhl für Didaktik und Ausbildungsforschung in der Medizin, Ziemssenstraße 1, 80336 München, Germany, martin.fischer@med.lmu.de
Frank Fischer, Department of Educational Science and Educational Psychology, Leopoldstr. 11, 80802 München, Germany, frank.fischer@psy.lmu.de

Abstract: External scripts have been widely used to guide computer-supported collaborative learners, yet little attention has been given to the internal collaboration scripts. These internal scripts can contain procedural knowledge, which is elaborated, organized and flexible. Is there evidence for expertise on collaboration and, if so, is it domain-specific or domain-general?
If there is expertise on collaboration the retrieval of rich internal collaboration scripts should be differentiable from the retrieval novices' scripts. In two studies collaborative experts and novices of the domains academia and medicine were confronted with stimuli, in which people were involved in, sometimes technology-supported, collaborative activities. To test for domain-specifity stimuli differed regarding the same vs other domain as the subject. The answers were subsequently coded.
There is evidence for expertise on collaboration as the results show that experts retrieve more script-like information overall. The difference was significant for stimuli regarding the same content domain, thus indicating domain-specifity.

Background

Collaborative learning research has made a case that through participation individuals gradually internalize collaborative practices and use these skills in other contexts as well (Kolodner, 2007). It is argued that experts have a better organization of procedural knowledge structures (Fischer, Kollar, Stegmann, & Wecker, 2013). An expert in collaboration should therefore have elaborated procedural knowledge regarding collaborative situations (internal collaboration scripts), while novices scripts are not as elaborated. Collaborative experts should be defined as those who consistently collaborate and outperform others in collaborative situations. It is an unanswered question how to empirically and reliably assess the difference between novices and experts internal collaboration scripts.

A substantial difference between other expertise domains and expertise in collaboration is that a second domain, the content domain, is needed, in which the experts collaborate in. It is an open empirical question whether experts in collaboration in one content domain can apply their internal scripted knowledge when confronted with a collaborative situation of another content domain.

We investigated the following explorative research questions in two studies, which have not been addressed systematically so far.

Is there evidence of collaboration expertise?
To what extent is collaboration expertise domain specific?

Hypothesis study 1

When confronted with a collaborative situation collaboration experts should be able to easily recall their internal collaboration scripts, while novices do not yet have these knowledge aspects.

Hypothesis study 2

If collaborative expertise is domain-specific a collaborative situation of their content domain should activate the experts internal collaboration scripts, while collaborative situation of another content domain should not activate the scripts. If collaborative expertise is domain-general, the difference between collaborative experts and novices should be independent from the situations' content domain.

Method

Study 1

Ten collaboration novices (six female, M=23, SD=2.4 years), social-science students from LMU Munich and ten experts (three female, M = 38.40, SD=7.32 years) volunteered for the study. To qualify as a collaborative expert one had to have worked collaboratively for the last seven years at least a mean of two hours per workday.

To standardize expertise in the content domain experts needed to have advanced at least one hierarchical level (PhD or specialist degree).

To trigger collaboration scripts through standardized collaborative situations novices and experts were shown pictures and videos as stimuli. The pictures contained collaborative situations (workshop or small group work). After introduction the investigator showed the participant one of four counter-balanced pictures for five seconds. Then the participant was asked to write down the answer to the "recall question"–What did you see on the picture? The same procedure was repeated for another picture. For the remaining pictures the participants were asked to answer three "script questions": What has most likely led to the situation? What happens in the situation? What is most likely to happen next in the situation?. The participants were given as much time as they needed to answer.

Study 2

Twenty novices (thirteen female, M=25.75, SD=4.7 years) and twenty collaboration experts (eight female, M=41.57, SD=7.87 years) volunteered for the study. All novices were medical students of LMU Munich. We investigated specialists who need a high amount of collaboration (internal medicine and anaesthesiologists).

Counter-balanced one of eight stimuli (four videos, four pictures) containing collaborative situations in medical contexts was shown to each participant for five seconds. The same procedure was repeated eight times; four times asking the recall question, and four times asking script questions, controlling for a balanced combination of stimuli type (picture/video) and question type (recall/script questions). After the eighth stimuli the participants were shown two collaborative situations of an academic setting to compare their answers to the answers out of their own content domain.

Coding scheme

For both studies the same coding scheme was developed to analyse the data. Two main categories were defined: superficial and script information. To assess detailed collaborative script information the categories of Kollar, Fischer, and Hesse (2006) were used. For example it specifies activities and roles as the important determinants in collaboration scripts. When the question is answered how this situation might continue and a person would be described as summarizing the tasks this would be coded as one activity. One investigator coded all of the transcripts and 10% of the transcripts was also coded by a student-assistant (Cohens kappa =.84).

Results

Study 1

A t-test revealed that collaboration experts ($M_{experts}$=25.20, SD=5.88) stated significantly more script information than novices ($M_{novices}$=13.80, SD=4.4), $t(18)=4.88$, $p<0.01$, $\eta^2=0.57$. As well for the recall questions a t-test revealed that collaboration experts ($M_{experts}$=5.80, SD=1.62) stated significantly more script information than novices ($M_{novices}$=2.40, SD=2.27), $t(18)=3.86$, $p<0.01$, $\eta^2=0.45$.

Study 2

A MANOVA revealed, as hypothesized the collaboration experts stated significantly more script information ($M_{experts}$=71.65, SD=33.23) than the novices ($M_{novices}$=54.25, SD=15.01), $F(1;38)=4.55$; $p<.05$; $\eta^2=.11$.Furthermore, when stimulated by videos experts ($M_{experts}$=31.60, SD=14.90) stated significantly more script-like information than novices ($M_{novices}$=22.95, SD=9.03) as revealed by the MANOVA $F(1;38)=4.93$; $p<.05$; $\eta^2=.12$. Outside the medical domain neither the difference for the picture ($M_{experts}$=5.10, SD=4.60, $M_{novices}$=5.00, SD = 4.14), nor for the videos ($M_{experts}$=6.60, SD=4.44; $M_{novices}$=4.65, SD=2.39) was significant ($F(1;38)=1.45$; n.s.).

Discussion

Experts differ regarding their knowledge of collaborative situations. Our studies are a first attempt to reliably assess experts' internal collaboration scripts. The collaborative experts draw their knowledge from their internal scripts, nonetheless which question they are asked. The difference between collaborative experts and novices disappears when confronted with situations outside their content domain. However, content domain dependency has to be further investigated in other content domains as past research has argued for domain independency of collaborative expertise (Kolodner, 2007). Further research is needed to better analyze the subcomponents of internal collaboration scripts.

References

Fischer, F., Kollar, I., Stegmann, K., & Wecker, C. (2013). Toward a Script Theory of Guidance in Computer-Supported Collaborative Learning. Educational Psychologist, 48 (1), 56-66.

Kollar, I., Fischer, F., & Hesse, F. W. (2006). Collaboration scripts–a conceptual analysis. Educational Psychology Review, 18(2), 159-185.

Kolodner, J. (2007). The roles of scripts in promoting collaborative discourse in learning by design. Scripting Computer-Supported Collaborative Learning, 237-262.

Acknowledgments

The authors would like to thank all novices and experts who took part in the studies as well as the helpful contributions of the students Fara Semmelies and Martin Gluza to this work.