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Connecting CSCL Scripting And Socially-Shared Regulation Of Learning: An Exploratory Study

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Abstract: This study explores which processes of socially-shared regulation are triggered by a CSCL script based on the pyramid pattern. The study involved two undergraduate courses where students (n=33) employed the CoTrackV2 tool to collaborate online. The study shows how CSCL scripts are key in the analysis and interpretation of chat data and suggests that collaboration patterns trigger regulatory processes, but not the same in all groups, leading to different regulatory strategies.

Introduction

Multiple works have been carried out in the field of Computer-Supported Collaborative Learning (CSCL) to structure the flow of collaboration through scripts (Weinberger et al., 2009). Additionally, Collaborative Learning Flow Patterns (CLFP) have been proposed to give specific structures to CSCL scripts aimed at fostering certain types of interactions (Hernández-Leo et al., 2005). However, research on CSCL scripts and patterns, more focused on knowledge building, has scarcely addressed the problem of group regulation, which is critical for achieving effective collaborative learning (Järvelä et al., 2016). The collective regulatory processes that lead to shared regulation during collaborative learning are the focus of the Socially-Shared Regulation of Learning (SSRL) (Järvelä et al., 2016).

A few works have tackled the relationship between CSCL and SSRL. Most of them introduce tools designed to support SSRL during collaborative activities. Others, such as (Miller & Hadwin, 2015), are specifically focused on the use of macro- and micro- scripts to enhance group regulation, including activities that explicitly correspond to the main phases of SSRL. However, as suggested by the authors, over-scripting could eventually disturb group interaction and regulatory processes. This over-scripting problem could be avoided or, at least, diminished if the use of CLFPs could implicitly activate regulatory processes without having to explicitly include them in the design of learning situations. Consequently, the underlying research question addressed by the presented study is: *What SSRL processes are triggered by a CSCL script based on the pyramid pattern?*

The study

The study took place in two undergraduate courses on Computer Networks during 4 days in the academic year 2021 in a European University. N=33 students participated in the study, grouped into 8 different groups of size 4-5. Students participated in an introductory learning situation aimed at challenging their previous knowledge about certain computer network topics. The learning situation included two consecutive pyramids CLFPs of three levels: 1) solving an open-ended task individually; 2) comparing and discussing the individual solutions to propose a common one as a group; 3) presenting and debating the group proposals to the whole class. An online collaborative environment called CoTrackV2, www.cotrack.website/, was used to carry out the group tasks of both pyramids. CoTrackV2 offered the possibility to write documents collaboratively and interact through a built-in chat.

Data coding

In this first exploration, we only made use of chat data, carrying out a conversational analysis. We coded the conversations of the groups, considering the turns of each speaker (n = 1374 turns) as the unit of analysis. Although there are several proposals of coding schemas for SSRL, we opted for using the one presented in (Molenaar et al., 2014) that proposes 3 main categories of codes: cognitive (5 subcategories), metacognitive (5 subcategories) and relational (4 subcategories). The coding process considered the different types of regulation, although we only focused on SSRL in this study. Two raters independently coded two random groups (23% of the total turns), and according to the Gwet's AC1 measure, they reached an almost perfect agreement level of 0.808 for the main categories, and an almost perfect agreement of 0.910 for the subcategories. The remaining group conversations were coded by either one or the other rater.

Once we coded all the conversations, we carried out a descriptive analysis looking at the relative frequency of the codes that occurred in each chat during the group activities (level 2 of the pyramids). Moreover, we also explored the temporal sequencing of the regulatory codes trying to detect relationship with the structure

of the CSCL script and, more concretely, with the phases of the CLFP. For both analyses, we have also looked at the differences between the first pyramid and the second one, expecting some transfer from one to the other.

Results and conclusions

The **frequency analysis** suggests four types of regulatory processes. **Two groups (G1 and G4) learned to be more "executive"** in the second pyramid, with respect to the first one, since the relative frequencies of the codes `elaboration` (giving arguments when proposing a task solution) drops considerably from the first pyramid (G1 – P#1: 26.15%; G4 – P#1: 19.44) to the second (G1 – P#2: 5.88%; G4 – P#2: 3.74%). On the other hand, other **two groups (G2 and G7) learned to be more "reflective"**, as they spend more time elaborating in the second pyramid (G2 – P#1: 12.33%; G7 – P#1: 5.26) than in the first one (G2 – P#2: 25.93%; G7 – P#2: 28.79%). A third cluster is composed of **groups G3 and G6**, where the behavior is **overall executive**, with little `elaboration` in both pyramids (G3 – P#1: 4.29%; G3 – P#2: 8.57%; G6 – P#1: 3.61; G6 – P#2: 1.51). Finally, **groups G5 and G8 were balanced**, since the `elaboration` code was very frequent in both pyramids (G5 – P#1: 19.85%; G5 – P#2: 28.43%; G8 – P#1: 20.75%; G8 – P#2: 30.00%). Moreover, among all groups, the lack of `elaboration` is covered by a higher frequency of the code `processing`, which suggests that students were selecting individual proposals for the group without arguing about their decisions. Additionally, we have seen that the groups which learned to be more reflective (G2 and G7) and the groups that were more balanced (5 and 8) decreased their `planning` and `monitoring` activity from one pyramid to the other. However, the groups that learned to be more executive (G1 and G4) increased their `monitoring`. Regarding the groups that were executive from the beginning, both behave differently in terms of metacognitive activities.

Regarding **the temporal sequencing of the regulatory codes**, we have seen that there is a common pattern in all groups only at the beginning of the pyramids: 1) social interaction (greetings, jokes, …); 2) metacognitive activities (planning and monitoring); 3) cognitive activities (elaboration, processing, …). However, this behavior would be expected in any collaborative situation and cannot be attributed to the pyramid pattern. On the contrary, the rest of the sequences of regulatory codes shows few commonalities among the different groups.

All in all, it seems that the pyramid pattern did trigger regulatory processes, but not the same in all groups, leading to different regulatory strategies. This result suggests the need of making SSRL phases explicit in the script, as explored by (Miller & Hadwin, 2015), if the teacher expects specific regulatory processes to happen, or the possibility of supporting groups that are not following the desired processes during the learning situation. The study has also shown how CSCL script information is crucial for guiding the analysis and interpretation of the data, as suggested by recent works on "Collaboration Analytics" (Martínez-Maldonado et al., 2021). However, this is only initial evidence obtained from the analysis of the chats. To obtain more accurate conclusions, we will also have to analyze the logs from the shared documents built in CoTrackV2.

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