

Will Structuring the Collaboration of Students Improve Their Argumentation?

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Abstract. Learning to argue in a computer-mediated and structured fashion is investigated in this research. A study was conducted to compare dyads that were scripted in their computer-mediated collaboration with dyads that were not scripted. A process analysis of the chats of the dyads showed that the scripted experimental group used significantly more words and engaged in significantly more broadening and deepening of the discussion than the non-scripted control group.

Keywords: computer-supported collaborative learning, argumentation.

1 Introduction

Researchers have been increasingly more interested in studying how to use technology to help students learn argumentation skills [1]. This work follows, in particular, from others who have investigated the effect of scripts [2] on the learning of argumentation. We present initial results of our approach to engage student dyads in critical debate in a computer-mediated setting. Their task was to critically review argumentation texts on a controversial issue (global warming ethics) and to jointly take a reasoned position. Our main research question is: Will structured student collaboration lead to higher quality argumentation?

2 Research Design

Based on insights we obtained from the literature (e.g. [3, 4, 5]) we devised an instructional design founded on three principles: **(P1)** students should have time to form a personal opinion on a controversial issue before engaging in social interaction, **(P2)** better discussions and more learning can be expected when a conflict of opinions exists between students, and **(P3)** through instructional guidance, productive collaboration and discussion norms can be stimulated. Our hypothesis is that an intervention based on **P1**, **P2** and **P3** will lead to a higher quality of argumentative interaction (**H1**) and in turn to more learning (**H2**). This paper focuses on **H1** and a process analysis to evaluate it; an investigation of **H2** is deferred to future work.

We carried out a study in the context of an “Introduction to Philosophy” course at a U.S. university. Three sessions with required attendance were conducted. A quasi-experimental pretest-intervention-posttest design with two conditions was employed. The final data analysis is based on 8 control dyads and 11 experimental dyads.

Fig. 1 depicts the experimental procedure. The data was collected on Nov 19th and Dec 3rd, 2010. In preparation for the experimental sessions, students read two texts that advocate different policies with respect to global warming ethics (“drastic GHG reductions” versus “moderate GHG reductions plus smart policies to remedy other problems mankind is suffering from”). The task environment consisted of Google Documents (<https://docs.google.com/>) that contained instructions, input fields to answer essay questions, and a chat tool.

The control group worked collaboratively and in a self-organized manner on both days (unscripted collaboration). On Nov 19th students were asked to paraphrase the arguments from both texts (Q1 and Q2), and to decide jointly which argument was more compelling (Q3). They were allowed (and encouraged) to consult the two source texts. On Dec 3rd students were asked to argue for and justify the text they considered to be more compelling, without access to the source texts. Instead, they received their answers from the Nov. 19th session. We expected livelier discussion when students use their own interpretations rather than skimming through the source texts again.

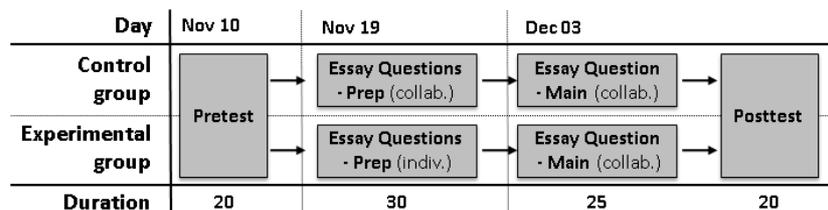


Fig. 1. Experimental procedure

The experimental group differed from the control group in several respects. On Nov 19 they worked individually (**P1**). To increase the chances of creating different preferences we used two slightly different versions of the essay questions Q1 and Q2, which were biased towards one of the two positions (reproduce one argument and rebut the other argument). Analogous to the control group (yet individually), students decided on the argument they preferred (Q3). On Dec 03 students with different preference were paired up (**P2**). Collaboration was scripted in this session through a set of instructions (**P3**). The task itself was identical to that of the control group.

We analyzed the chat protocols using a code-and-count approach. We used the two *Rainbow* [6] categories focused on collaborative argumentation: (1) “Argumentation” (statements used to increase / decrease the believability of a thesis) and (2) “Broaden & Deepen” (arguing and elaborating on arguments, e.g., rebutting an argument or discussing or concepts central to an argument), as well as a third category of our own design (3) “Text Talk” to code messages that elaborate content but not in an argumentative fashion. In order to fairly compare the control and experimental group interactions, we compared the Dec 03 experimental protocols with the combined control protocols of the Nov 19 and Dec 03 sessions.

3 Results and Conclusion

Table 1 summarizes the results with respect to the three codes discussed above. Note, first of all, that the experimental dyads produced more than 5 times as many instances of “Broaden & Deepen” (4.27 vs. 0.75 messages), a significant and large effect. On the other hand, notice that approximately the same amount of “Text Talk” and “Argumentation” took place in the two groups. Yet, the experimental group required less than half the time for the same amount of this elaborative activity.

Table 1. Comparison of conditions based on argumentation codes

Code	Control		Experimental		Comparison			
	M	SD	M	SD	Diff	F	p	d
Argumentation*	2.13	2.17	2.09	1.45	-0.04	0.00	1.00	0.00
Broaden & Deepen*	0.75	1.04	4.27	3.74	3.52	6.62	0.02*	1.20
Text Talk^	1.88	2.64	2.09	2.59	0.21	0.03	0.86	0.08

* - From the Rainbow coding system; ^ - Newly defined code

It can be concluded that the experimental intervention was successful in improving the argumentative quality of interaction. Yet, the overall quality of interaction in both conditions was relatively low. We will use the theoretical and technical conclusions of this experiment for the design of future studies.

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