The Effects of Active vs. Reflective Learning Style on the Processes of Critical Discourse in Computer-Supported Collaborative Argumentation

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Biographical Notes

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The effects of active versus reflective learning style on the processes of critical discourse in computer-supported collaborative argumentation

Abstract
This study examined how message-response exchanges produced in the interactions between active learners only, reflective learners only, active-reflective learners, and reflective-active learners affected how often active versus reflective learners posted rebuttals to arguments and challenges across four types of exchanges believed to promote critical discourse (argument-challenge, challenge-counterchallenge, challenge-explain, challenge-evidence) in computer-supported collaborative argumentation (CSCA). This study found that the exchanges between reflective learners produced 44% more responses than in the exchanges between active learners (*ES* = +0.17). The reflective-reflective exchanges produced 47% more responses than the active-reflective exchanges (*ES* = +0.18). These results suggest that groups with reflective learners only are likely to produce more critical discourse than groups with active learners only, and the ratio of active-reflective learners within a group can potentially influence overall group performance. These findings illustrate how specific traits of the learner can affect discourse processes in CSCA and provide insights into process-oriented strategies and tools for structuring dialogue and promoting critical inquiry in online discussions.

Keywords: computer-mediated communication, discourse analysis, asynchronous communication, distance learning

Introduction
Collaborative argumentation is an instructional activity used to foster critical reflection (Johnson & Johnson, 1992) as students work together to build arguments to support a position, consider and weigh evidence and counter-evidence, and test out uncertainties to construct shared meaning, achieve understanding, and examine complex ill-structured problems (Cho & Jonassen, 2002). This process not only plays a key role in increasing students' understanding but also in improving group decision-making (Lemus, Seibold, Flanagin & Metzger, 2004). To facilitate the processes of collaborative argumentation, online discussion boards are being increasingly used in ways to foster dialogue and in-depth discussions (Tallent-Runnels et al., 2006). However, studies show that the quality of online discussions is often shallow (Pena-Shaff, Martin, & Gay, 2001) and that online students often resist challenging the ideas of other students (Nussbaum, 2002). As a result, a growing number of researchers are developing ways to promote critical thinking in computer-supported collaborative argumentation (CSCA) by using online environments and procedures to guide students through the processes of argumentation.

In CSCA, constraints are imposed on what messages (or dialog moves) can be posted to a discussion to guide students through the processes of collaborative argumentation. Jeong (2005a) presented students with a fixed set of message categories (argument, challenge, supporting evidence, explanation) to foster argumentation in asynchronous threaded discussions. Prior to posting each message, students were required to classify and label each message by inserting a tag corresponding to a given message category in the message heading. Similar constraints are implemented in ShadowPDforum (Jonassen & Remidez, 2005) where message constraints are built directly into the computer interface so that

students are required to select and classify the function of each message before a message can be posted to the discussions. This approach has been implemented in other communication tools as well to facilitate collaboration and group communication. These tools include Belvedere (Cho & Jonassen, 2002; Jonassen & Kwon, 2002), CSILE (Scardamalia & Bereiter, 1996), ACT (Duffy, Dueber, & Hawley, 1998; Sloffer, Dueber & Duffy, 1999), Hermes (Karacapilidis & Papadiasi, 2001), FLE3 (Leinonen, Virtanen, & Hakkarainen, 2002), AcademicTalk (McAlister, Ravenscroft & Scanlon, 2004), and NegotiationTooli (Beers, Boshuizen, & Kirschner, 2004).

However, the findings in CSCA research have been mixed and there is little conclusive evidence to show that CSCA improves student performance and learning (Baker & Lund, 1997). Message constraints (and other variations of this procedure) have been found to elicit more replies that elaborate on previous ideas, and produce greater gains in individual acquisition of knowledge (Weinberger, Ertl, Fischer, & Mandl, 2005). Message constraints generated more supported claims and achieve greater knowledge of the argumentation process (Stegmann, Weinberger, Fischer, & Mandl, 2004). In contrast, no differences were found in individual knowledge acquisition, students' ability to apply relevant information and specific domain content to arguments, and ability to converge towards a shared consensus. Message constraints have also been found to produce fewer challenges per argument than argumentation without message constraints (Jeong & Juong, 2007).

Given that CSCA is both an intellectual and social activity, one possible explanation for the mixed findings is that learners' dispositions to engage in argumentation and express disagreement have not been taken into consideration. Because students are often reluctant to criticize the ideas of other students (Lampert, Rittenhouse, & Crumbaugh, 1996; Nussbaum, 2002), Nussbaum et al. (2004) examined the combined effects of personality traits and the use of prompts (e.g., "My argument is…", "On the opposite side…", "Explain why…") for supporting critical discussions in online environments and found that when prompts were used, disagreements were expressed more often by students who were less open to ideas, less anxious, and less assertive than students who were more open to ideas, more anxious, and more assertive. Every unit increase in a group's average score on assertiveness, openness to ideas, and anxiety were found to reduce the odds of a disagreement by 13%, 13%, and 16%, respectively. Furthermore, Chen & Caropreso (2004) found that groups with high profile and mixed profiles (high and low) across the "Big Five" personality traits (extraversion, neuroticism, agreeableness, conscientiousness, openness) produced more messages that solicited and invited others to reply than low and neutral profile groups.

Another factor that must be taken into consideration is the learner traits that determine which students are reluctant to rebut or respond back to students that challenge their ideas. Jeong (in press) examined the effects of intellectual openness (e.g., open to new ideas, needs intellectual stimulation, carries conversations to higher levels, looks for deeper meaning in things, is open to change, and is interested in many things) and found significant differences in the number of personal rebuttals posted between the less versus more intellectually open students within male-only exchanges, but no significant differences were found within female-only exchanges. Jeong & Davidson-Shivers (2006) found that females posted fewer personal rebuttals to the disagreements and critiques of

females than males, and males posted more personal rebuttals to the critiques of females than females. All of these findings suggest that the efficacy of CSCA may depend on the characteristics or dispositions of the CSCA participants.

To build on these previous findings, this study examined the effects of learning style on students' performance in CSCA given that learning styles have been shown to be stable indicators of how individual learners perceive, interact with, and respond to learning environments (Keefe, 1979). One particular learning style that may have direct impact on the processes of collaborative argumentation is the active/reflective dimension of individual learning styles. Active learners enjoy the cooperative problem solving process (Dewar & Whittington, 2000; Nussbaum, 2002) and therefore prefer to brainstorm out loud with a group of people, and process information through engagement in physical activity. Active learners also tend to retain and understand information best by discussing and explaining information to others, and by applying information (Felder-Silverman, 1988). In contrast, reflective learners are more introspective and prefer to reflect on the information and test the given information prior to applying the information (Anderson & Simpson, 2004; Carabajal, Lapointe & Gunawardena, 2003). Given these findings, there is reason to believe that reflective learners will more often than active learners test and verify ideas by, for example, replying to arguments with challenges and replying to challenges with counter-challenges, supporting evidence, and explanations.

To test the effects of learning style and identify strategies for forming and guiding discussion groups in ways that promote critical discourse in CSCA, this study examined how the reflective and active styles of learning affect the way students engage one another in exchanges that produce critical discourse in terms of how often students challenge other students and how often students respond back to challenges with explanations and supporting evidence. Specifically, this study examined how active/reflective learning style affect how often students initiate a critical discussion and respond to other students messages in ways that produce deeper inquiry (e.g., argument → challenge → no reply vs. counter-challenge vs. explain vs. evidence).

Theoretical framework and assumptions

To examine how the learning styles of the learner affect how they engage one another in critical discourse, this study examined the responses generated within four types of exchanges (argument-challenge, challenge-counterchallenge, challenge-explain, challenge-evidence) believed to trigger and exemplify critical discourse based on the assumptions of the dialogic theory of language (Bakhtin, 1981; Koschmann, 1996). The dialogic theory presumes that: a) conflict is produced not by ideas presented in one message alone, but by the juxtaposition of opposing messages (e.g., argument-challenge, challenge-counter challenge), and b) conflicts produced in these exchanges help to trigger and shape further inquiry or subsequent responses that serve to dismiss or rebuke a challenge (e.g., argument-challenge-counterchallenge), or verify (e.g. argument-challenge-evidence) and justify (e.g., argument-challenge-explain) arguments. Support for this theory can be drawn from extensive research on collaborative learning that shows conflict and the consideration of both sides of an issue is needed to drive further inquiry, reflection, articulation of individual viewpoints and underlying assumptions, and achieve deeper understanding (Johnson & Johnson, 1992; Baker & Lund, 1997).

Research questions

Given that reflective learners possess a higher tendency than active learners to reflect on and test information, and given that language and meaning is dialogic and interactive in nature, this study tested the effects of active-reflective learning style on group performance and interaction in CSCA by addressing the following questions:

1. Are there differences in the number of responses posted by active versus reflective learners in adversarial exchanges in mixed group debates?

2. How do the interactions between students with the same versus different learning styles affect the number of response posted by active versus reflective learners in adversarial exchanges?

Method

Participants

The participants were graduate students (n = 33) from a major university in the Southeast region of the U.S., consisting of 22 females and 11 males, and ranging from 20 to 50 years in age. The participants in this study were students enrolled in a 16-week online graduate introductory course on distance education in the fall 2005 and spring 2006 term.

Debate procedures

This study examined students' participation in three weekly team debates using threaded discussion forums in Blackboard™, a web-based course management system. Student participation in the debates and other discussions in the course contributed to 20% of students' grade. Students were randomly assigned to one of two teams (balanced by gender) to either support or oppose a given position and were required to post a minimum of four messages per debate. After every debate, a poll was conducted to determine which team presented the strongest arguments. The purpose of each debate was to critically examine design principles and issues related to the design and delivery of online instruction.

Students were presented a list of four message categories (see Figure 1) during the debates to encourage students to support and refute presented arguments with supporting evidence, explanations, and challenges (Jeong & Juong, 2007). Based loosely on Toulmin's (1958) model of argumentation, the response categories and their definitions were presented to students prior to each debate. Each student was required to classify each posted message by category by inserting the corresponding label into the subject headings of each message (along with a short descriptive title representing the main idea presented in the message), and restrict the content of each message to address one and only one category or function at a time. The investigator occasionally checked the message labels to determine if students were appropriately labeling their messages according to the described procedures. Students were instructed to return to a message to correct errors in their labels. No participation points were awarded for a given debate if a student failed to follow these procedures.

Students identified their messages by team membership by adding "-" for opposing or "+" for supporting team with each label (e.g., +ARG, -ARG) to enable students to locate the

exchanges between opposing teams (e.g., +ARG → -BUT) and respond to messages within these exchanges to advance their position (see example in Figure 2). One discussion thread was designated for posting supporting arguments. A second thread (not shown in Figure 2) was designated for posting opposing arguments. Figure 3 provides an excerpt from one of the debates to illustrate some of the messages exchanged in the debates.

Insert Figures 1 – 3 about here

Learning style instrument

The Index of Learning Styles (ILS) Questionnaire was used to profile students' learning style (Felder, 1994). The questionnaire consisted of 11 force-choiced items to determine the learning style of each student (active or reflective learning style). In the first cohort were 11 and 9 reflective and active learners, respectively. In the second cohort were 7 and 6 reflective and active learners, respectively.

The data set

ForumManager (Jeong, 2005b) was used to download the messages from Blackboard™ discussion forums into Microsoft Excel, which maintained the hierarchical threads and information used to determine which responses were posted in reply to which messages. The initial data set consisted of 593 messages. No outliers (three or more standard deviations from the mean) were found in the total number of messages posted per student.

The Discussion Analysis Tool (Jeong, 2003, 2005a & 2005c) was used to extract the codes assigned to each message from the subject headings to tag each message as argument (ARG), evidence (EVID), challenge (BUT), or explanation (EXPL). DAT was then used to tally the frequency of responses elicited by each type of message (e.g., number of challenges posted in response to *each* observed argument) to generate the raw scores used to test the effects of learning style (see Figure 4).

Insert Figure 4 about here

Messages from the debates were randomly selected and coded by the investigator to test for errors in the labels. Overall percent agreement was .91 based on the codes of 158 messages consisting of 42 arguments, 17 supporting evidence, 81 challenges, and 17 explanations. The Cohen Kappa coefficient, which accounts for chance in coding errors based on the number of categories in the coding scheme, was .86 – indicating excellent inter-rater reliability (Bakeman & Gottman, 1997, p. 66).

Results

Effects of learning style

No significant differences were found in the number of replies posted per student per debate between active versus reflective learners across the four types of exchanges (argument-challenge, challenge-challenge, challenge-explain, and challenge-evidence exchanges), $F(1, 124) = .50$, $p = .480$ (see Table 1).

Effects of learning style exchange

Two reflective learners in the first cohort and one reflective learner in the second cohort were randomly selected and the messages posted by these three students were omitted from the data in order to: a) balance the ratio of active to reflective learners within each cohort; and b) eliminate any chance that the higher frequency of reflective learners would inflate the number of responses posted by reflective learners. As a result, the responses of 15 reflective learners and 15 active learners were examined. A 4 x 4 (learning style exchange x exchange type) univariate analysis of variance was used to compare the mean number of responses posted in the active-active, reflective-reflective, active-reflective, and active-active learner exchanges within each of the four types of exchanges. A significant difference was found in the mean number of responses posted between the four learning style exchanges across all four types of exchanges, $F(3, 1742) = 7.60$, $p = .000$. The interaction between learner style exchanges and type of exchange was significant, $F(9, 1742) = 4.41$, $p = .000$. This indicates that the observed differences between the four learning style exchanges depended on the specific type of exchange where students posted their responses. The mean scores and effect sizes are shown in Tables 2 and 3, respectively.

Insert Tables 1 - 3 about here

The results of the Tukey HSD post-hoc comparisons revealed significant differences in the mean number of responses elicited in the reflective-reflective versus active-active exchanges ($p = .038$) and the reflective-reflective versus active-reflective exchanges ($p = .021$). The exchanges between reflective learners only elicited 44% more responses across the four exchange types than in the exchanges between active learners only, $ES = +0.17$, with the largest differences observed in challenge-counterchallenge exchanges. The reflective-reflective exchanges produced 47% more responses than the active-reflective exchanges, $ES = +0.18$, with differences observed primarily in argument-challenge, challenge-counterchallenge, and challenge-explain exchanges. Although the overall effects of learning style were small (Cohen, 1992), larger effect sizes were found within specific types of exchanges, particularly in the argument-challenge and challenge-counterchallenge exchanges. Table 3 also reveals a tendency of active learners to post more responses when replying to arguments and challenges posted by reflective learners than to those posted by active learners (AA vs. RA).

Discussion

This study examined how active and reflective learning styles affect student performance and the interactions between students that promote or inhibit critical discourse in CSCA. This study found that: a) the exchanges between reflective learners produced more critical

discourse than in the exchanges between active learners; and b) the arguments and challenges posted by reflective learners elicited more rebuttals from *both* reflective and active learners than those posted by active learners. However, the findings also revealed no overall differences in performance between active versus reflective learners, due primarily to the similarities and differences observed in the number of responses produced in the exchanges between students with different learning styles. In these exchanges across learning styles, no differences were found in the number of rebuttals posted by active learners versus reflective learners when the rebuttals were posted in reply the arguments and challenges of reflective learners. In addition, reflective learners produced fewer rebuttals when responding to active learners versus responding to reflective learners.

Overall, these findings demonstrate how the quality of discourse (the degree to which claims are tested on their merits and truth value) can be influenced by the learning styles of students participating in CSCA. Specifically, groups with higher ratios of reflective to active learners can generate higher levels of critical discourse than groups with lower ratio of reflective to active learners. The findings in this study also suggest that improvements in the performance of active learners can be achieved by creating groups that consist of a balanced mix of active and reflective learners to enable exchanges across learning styles. Differences in active-reflective learner ratio could have a large and significant impact on student performance in smaller groups (five or less students), when the ratio of active-to-reflective learners is more likely to be skewed (e.g., group with only or mostly active learners). As a result, future studies on the effects of CSCA, particularly when used with small groups, may need to take the learning styles of its participants into consideration. Finally, the findings in this study provides guidelines on how information about students' learning style can be strategically used to form more productive groups in CSCA, and used to predict, diagnose, and identify courses of action that can be taken to raise the level of critical discourse in CSCA.

Due to limitations in the scope and design of this study, these findings are not conclusive. Future studies will need to examine: a) the effects of learning style using controlled groups; b) the characteristics of arguments and challenges posted by reflective learners that elicit rebuttals; c) larger student samples; d) effects of learning style across different or less structured task (e.g., message constraints, team assignments, requiring number of postings) to seek larger effect sizes; e) smaller discussion groups where the learning styles of its members might exert more influence; f) non-adversarial exchanges (e.g., argument-explain, argument-evidence) to identify areas where active learners perform better than reflective learners; and g) how observed interaction patterns affect specific learning outcomes (e.g., decision-making, problem-solving).

Overall, this study was an initial attempt to determine when and how active and reflective learning styles affects the way students engage one another in exchanges that promote critical discourse in CSCA. The methods and software tools used in this study to measure students' interactions and the effects of learning style present an alternative approach that hopefully will open new directions and opportunities to develop new tools that can assist instructors in analyzing the learner, forming groups, predicting, diagnosing, and optimizing group performance in collaborative learning, collaborative work, decision-making, and problem-solving in computer-supported environments.

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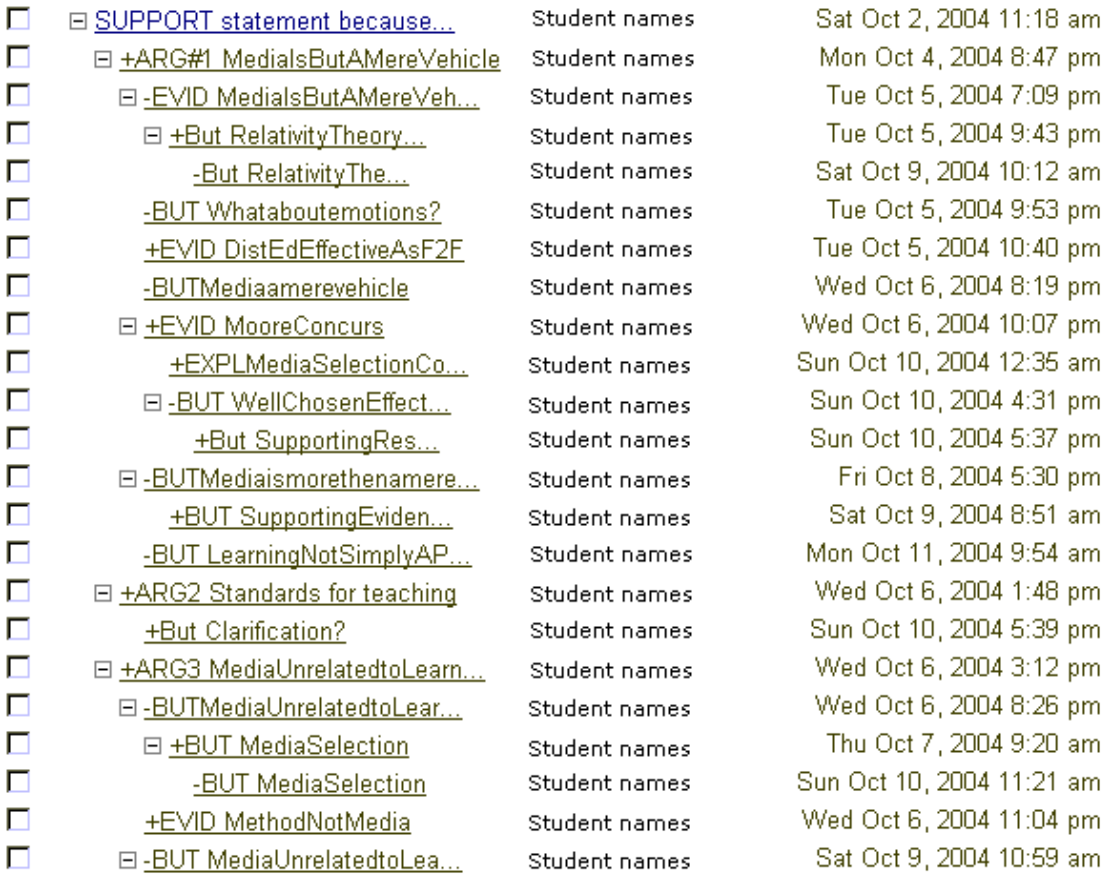
Figure 1. Example instructions on labeling messages the online debates

Label	Description of label	Example message by label
+	Identifies a message posted by a student assigned to the team supporting the given claim/statement	--
-	Identifies a message posted by a student assigned to the team opposing the given claim/statement	--
ARG#	Identifies a message that presents one and only one argument or reason for using or not using chats instead of threaded discussion forums). Number each posted argument by counting the number of arguments already presented by your team. Sub-arguments need not be numbered. ARG = "argument".	**-ARG1** One's choice of media makes very little difference in students' learning because the primary factor that determines level of learning is one's choice of instructional method.
EXPL	Identifies a reply/message that provides additional support, explanation, clarification, elaboration of an argument or challenge.	**-EXPL** As a result, media are merely vehicles that deliver instruction but do not influence student achievement any more than the truck that delivers our groceries causes changes in our nutrition.
BUT	Identifies a reply/message that questions or challenges the merits, logic, relevancy, validity, accuracy or plausibility of a presented argument (ARG) or challenge BUT).	**+BUT** However, one's choice of media can affect or determine which instructional methods are or are not used. If that is the case, then choice of media can make a significant difference.
EVID	Identifies a reply/message that provides proof or evidence to establish the validity of an argument or challenge.	**-EVID** Media studies, regardless of the media employed, tend to result in "no significant different" conclusions (Mielke, 1968).

Figure 2. Example debate with labeled messages in a Blackboard™ threaded discussion forum



Note: The names of students have been removed to protect students' confidentiality. The discussion thread for posting arguments to oppose the given statement ("OPPOSE statement because…") is out of view in the above illustration.

Figure 3. Example of a coded thread generated by an argument posted in opposition to the claim "Media makes *very little or no* significant contributions to learning"

Category	Message text
-ARG	Borje Holmberg's Theory of Interaction and Communication states that "learning pleasure supports student motivation" and "strong student motivation facilitates learning"(Simonson, p. 43). I would argue that compelling media and multi-media increases learning pleasure and thus facilitates student learning – Bob
+BUT	Bob, what research is available to support your statement "compelling media and multi-media increases learning pleasure and thus facilitates student learning"?
+EVID	"Extensive research findings indicate that no direct link has been established between delivery medium, level of interaction, and the effect of both on student achievement." Keast 1997. "...Kozma (1994) agrees with me that there is no compelling evidence in the past 70 years of published and unpublished research that media cause learning increases under any conditions. Like all other researchers who have made a careful study of the arguments and research studies (e.g., Winn,1990), he reaches a conclusion that is compatible with my claims (Clark, 1983)."
-BUT	From my perspective, Clarke's "Media Will Never Influence Learning" does not take into account the effect poor media has on learning. I have attended many a training session where the media was deplorable to say the least. While the content was there, I did not learn very much (if anything) because I was fighting the quality of the media. I would argue that if poor media can have detrimental effect, then good media can have positive effect on learning – Bob
-EXPL	Please refer to a report by Harold F. O'Neil, Univ. of Southern California, for the Office of Naval Research entitled "What Works in Distance Learning" Feb 23, 2003. The report offers a guideline (p. 37) for a multimedia strategy. I quote "People learn better from corresponding words and graphics (e.g., animation, video, illustrations, pictures) than from words alone". This report guideline is based on research conducted by R. E. Mayer and R. B. Anderson and published in the Journal of Educational Psychology 83, 484-490 and 84, 444-452. I would argue that more recent research is showing that multimedia contributes to learning. Thanks, Bob.
-EVID	Bob's -ARG5 talks to the research of Hilary Perraton in that multimedia provide more "effective" learning experiences. The pleasurability of the experience does support the effectiveness of the learning.

ARG = argument, BUT = challenge, EVID = supporting evidence, EXPL = explanation

Figure 4. Interaction data produced by Discussion Analysis Tool

	ARGa	BUTa	EXPLa	EVIDa	ARGr	BUTr	EXPLr	EVIDr	Replies	No Replies	Givens	% replies	% givens
ARGa	1	11	**12**	6	1	16	6	4	57	11	42	.12	.07
BUTa	0	23	3	3	0	23	5	2	59	88	138	.12	.23
EXPLa	0	10	4	1	0	7	4	0	26	31	51	.05	.09
EVIDa	0	4	2	1	0	7	0	3	17	18	29	.04	.05
ARGr	3	38	10	8	2	**33**	**36**	**18**	148	6	66	.31	.11
BUTr	0	33	10	3	0	**42**	9	6	103	76	152	.21	.26
EXPLr	0	11	8	2	1	14	11	3	50	39	76	.10	.13
EVIDr	0	7	1	1	0	9	5	2	25	21	39	.05	.07
	4	137	50	25	4	151	76	38	485	290	593		

Note: ARG = argument, BUT = challenge, EVID = supporting evidence, EXPL = explanation. Replies = observed number of replies posted to each message type. Tags a = active learner, r = reflective learner. No Replies = number of messages that did not receive a reply; Givens = number of messages observed; Reply Rate = percentage of messages that elicited at least one reply. The transitional probabilities in bold font and underlined were significantly greater than the expected probability (1/8 categories = .125) based on *z*-score tests with $p < .01$. Values in bold and in parenthesis were significantly less than the expected probability.

Table 1. Mean number of responses posted per student per debate between active versus reflective learners

LearnerStyle	ExchangeType	*M*	*STD*	*n*
Active	ARG-BUT	1.07	.62	15
	BUT-BUT	1.02	.66	15
	BUT-EXPL	.12	.28	15
	BUT-EVID	.00	.00	15
	Total	.55	.68	60
Reflective	ARG-BUT	.80	.63	18
	BUT-BUT	.96	.92	18
	BUT-EXPL	.17	.33	18
	BUT-EVID	.01	.06	18
	Total	.48	.70	72
Total	ARG-BUT	.92	.63	33
	BUT-BUT	.98	.80	33
	BUT-EXPL	.14	.31	33
	BUT-EVID	.01	.04	33
	Total	.51	.69	132

Table 2. Mean number of responses posted within learning style exchange X type of exchange

LearnerStyleExchange	ExchangeType	*M*	*STD*	*N*
Active->Active	ARG-BUT	.268	.501	41
	BUT-BUT	.142	.371	134
	BUT-EXPL	.022	.148	134
	BUT-EVID	.000	.000	134
	Total	.074	.280	443
Reflective->Reflective	ARG-BUT	.367	.727	49
	BUT-BUT	.271	.527	129
	BUT-EXPL	.039	.194	129
	BUT-EVID	.000	.000	129
	Total	.133	.413	436
Active->Reflective	ARG-BUT	.220	.475	41
	BUT-BUT	.149	.434	134
	BUT-EXPL	.007	.086	134
	BUT-EVID	.007	.086	134
	Total	.070	.296	443
Reflective-Active	ARG-BUT	.592	.705	49
	BUT-BUT	.163	.429	129
	BUT-EXPL	.023	.151	129
	BUT-EVID	.000	.000	129
	Total	.122	.385	436
Total	ARG-BUT	.372	.634	180
	BUT-BUT	.181	.445	526
	BUT-EXPL	.023	.149	526
	BUT-EVID	.002	.044	526
	Total	.100	.349	1758

Table 3. Effect size, percent difference, and post-hoc comparisons of mean response scores between learner style exchanges

	AA vs RR		AA vs AR		AA vs RA		RR vs AR		RR vs RA		AR vs RA	
	ES	*%Diff*	*ES*	*%Diff*	*ES*	*%Diff*	*ES*	*%Diff*	*ES*	*%Diff*	*ES*	*%Diff*
Arg-But	.16	.27	-.10	-.22	.53	.55	-.24	-.40	.31	.61	.62	1.70
But-But	.28	.48	.02	.05	.05	.13	-.25	-.45	-.23	-.40	.03	.09
But-Expl	.09	.42	-.12	-2.00	.01	.04	-.21	-.81	-.09	-.40	.13	2.12
But-Evid	.00	.00	.12	1.00	.00	.00	.12	.00	.00	.00	-.12	-1.00
Overall	.17	.44	-.02	-.06	.14	.39	-.18	-.47	-.03	-.09	.15	.74
p-value[1]		.038*		.997		.138		.021*		.954		.086

[1] Tukey HSD post-hoc comparisons; AA = active-active exchange, RR = reflective-reflective exchange, AR = active-reflective exchange, RA = reflective-active exchange; * significant at $p < .05$.[1] Tukey HSD post-hoc comparisons; AA = active-active exchange, RR = reflective-reflective exchange, AR = active-reflective exchange, RA = reflective-active exchange; * significant at $p < .05$.