Collaborative Writing of Argumentative Syntheses from Multiple Sources: The Role of Writing Beliefs and Strategies in Addressing Controversy

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Abstract: In this study, university students are faced with the task of collaboratively writing an argumentative synthesis from multiple sources. Specifically, in writing, they must integrate conflicting information on a particular issue obtained from reading two texts that present different perspectives. As research in this field has shown, university students' transactional beliefs about writing have a bearing on the quality of the texts that they write. In addition, studies on collaborative learning have demonstrated the role of constructive strategies in addressing controversy. Constructive strategies require an epistemic approach, which implies understanding and integrating opposing positions and rationales. Therefore, the specific aims of the study are to analyze the relationships between the following: (a) writing beliefs and the joint written synthesis, b) writing beliefs and the strategies used to address the controversies that emerge during collaborative writing, and (c) how students resolve controversies and the quality of their joint syntheses. The participants were 52 fourth-year psychology students at a state-run university in Madrid. The results show that transactional writing beliefs are associated with both the controversy strategies employed by members of student dyads and the quality of the joint syntheses. Furthermore, the strategies for addressing controversy are associated with the quality of the joint syntheses.

Keywords: transactional writing belief, collaborative writing, controversy, argumentative synthesis

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First Studies of collaborative writing have revealed the benefits of this form of social organization in the classroom compared to individual writing in regard to the level of involvement in the task, the perception of learning and the quality of the written products generated by students (McAlister, 2005; Shehadeh, 2011; Storch, 2005). Particularly with regard to argumentative texts, the benefits of collaboration may even be greater than those gained in writing other types of texts, given the dialogic nature of argumentation. As Ferretti and Lewis (2013) argue, "argumentation is an inherently dialogic activity between people who have a difference of opinion about a controversial issue" (p.115). For this reason, collaborative approaches provide a framework for supporting the development of students' argumentative thinking and writing. These approaches help students understand and compare different perspectives by engaging them in planning, composing, and revising argumentative essays within groups.

The dialogic nature of argumentation is highlighted when the task involves writing a synthesis from source texts that present different perspectives on a controversial issue. Writing an argumentative synthesis requires contradictory ideas from several sources to be integrated in the text.

Exploring and integrating various sides of an issue to reach a reasoned conclusion implies adopting a constructivist epistemological position and, therefore, may require a particular manner of conceiving the nature of writing; in other words, it may be related to the types of writing beliefs that the student holds.

Nevertheless, the results attained in a collaborative task can be influenced by variables related to the collaboration itself. Indeed, there are studies that focus on the role that collaboration plays in the composing process and the effect that different types of student interactions and strategies developed writing in groups have on learning (Marttunen & Laurinen, 2012; Onrubia & Engel, 2009; Wigglesworth & Storch, 2009, 2012). With regard to tasks that involve conflictive information, it may be especially useful to study the strategies – more constructive as opposed to more destructive – employed by groups of students when they are engaged in a controversy (Johnson & Johnson, 2003).

In this study, in collaboration with a partner, university students are faced with the task of writing a synthesis in which, in writing, they must integrate conflicting information on a particular issue obtained from reading various different texts. The overall aim of the study is to explore the roles played by writing beliefs in the manner in which students approach the task of writing an argumentative synthesis and by the strategies they use to address controversy during the synthesis task.

The issues we are concerned with are: writing argumentative syntheses from multiple texts, the role played by writing beliefs in writing performance, and the role of strategies in resolving controversies in group tasks. These issues are introduced in the next three sections.

1. Writing an argumentative synthesis from multiple texts

Writing a synthesis based on two or more sources is a *hybrid* task; it is very demanding and has a strong potential for knowledge acquisition (Mateos & Solé, 2009; Mateos, Solé, Martín, Miras, Cuevas & Castells, 2014; Segev-Miller, 2004; Spivey, 1997). This type of written composition involves not only selecting the relevant information from the source texts but also integrating the ideas from each of them (Leijten, Van Waes, Schriver & Hayes, 2014; Perfetti, Rouet & Britt, 1999; Segev-Miller, 2007). Indeed, the writer must identify the ideas that he/she wants to include in the synthesis, decide the organizing theme and give structure to the new text, connecting and integrating the selected information.

University teachers frequently demand that students write a synthesis, mostly in certain majors (Mateos, Villalón, De Dios & Martín, 2007; Wiley, Steffens, Britt & Griffin, 2014). In particular, in this study, we examined a task in which students were asked to construct an argument from texts that advanced different views on a controversial topic, given that the ability to understand different perspectives, assess them, and merge them into one's own position is an essential skill for university students. Well-founded argumentation requires not only formulating a thesis and supporting it with evidence but also identifying the different positions around an issue, weighing the arguments for and against each of them, and, finally, integrating the different perspectives (Kuhn, 1999, 2005; Voss, 2001).

In a study on the writing of opinion essays, Nussbaum and Schraw (2007) distinguish between persuasive writing and reflective writing. Persuasive writing tends to promote one-sided reasoning in the sense that it leads one to develop a thesis and defend it by citing reasons and evidence in support of that position, whereas reflective writing focuses on exploring and integrating various sides of an issue to reach a reasoned conclusion. These authors identify several strategies that students can use in writing opinion essays. First, in a pseudo-integration strategy, a particular side is argued to be stronger but is supported simply by presenting supporting arguments and ignoring counterarguments. Second, in a refutation strategy, one or more arguments on a particular side of an issue are shown to be false, irrelevant or insufficiently supported. Although a rebuttal implicitly acknowledges and responds to the counterarguments, refutation is not a strong integration strategy because it tends to be associated with one-sided reasoning rather than balanced reasoning. Third, in an integration strategy, the author considers both sides and then explains which side has the stronger argument (weighing strategy), or the author arrives at a final standpoint that lies between the differing sides (synthesis strategy). Only the last two are associated with two-sided reasoning.

Consequently, writing an argumentative synthesis entails the composition of a reflective essay, in the sense that this process requires the ability to critically evaluate and combine arguments and counterarguments from multiple source texts into an overall final position.

2. The role of writing beliefs in writing performance

Recent studies (Mateos & Solé, 2012; Villalón & Mateos, 2009) show the interest in analyzing student beliefs about writing. The different ways in which students conceive writing and how these relate to both the strategies that they use when tackling writing tasks and the resulting written products are a topic that has been investigated from different approaches, such as phenomenography (e.g., Ellis, Taylor & Drury, 2006; Lavelle & Bushrow, 2007) and the implicit theories or models approach (White & Bruning, 2005), which is the approach we have used in this study and in other previous research (Mateos, Cuevas, Martín, Martín, Echeita & Luna, 2011; Miras, Solé & Castells, 2013; Villalón & Mateos, 2009; Villalón, Mateos & Cuevas, 2015).

The phenomenographic approach seeks to comprehend the qualitatively diverse methods of experimenting in writing from the student perspective, whereas implicit writing models involve different tacit epistemological positions about what meaning is and how to reach it.

White and Bruning (2005) propose two implicit models of writing. The transmission model involves the belief that meaning is independent of the writer and must be transmitted from the author into the reader's memory. The transaction model involves the belief that meaning exists in the mind of the writer and must be actively constructed by writers through integrating their own thinking into the process. The transmission model predisposes writers to be passive transmitters of meaning rather than active constructors of meaning. By contrast, holding beliefs that are consistent with the transaction model should lead to more critical and personal engagement during the writing process. White and Bruning (2005) postulate that these two models are independent of each other. Therefore, it is possible to agree with the supposition of one of the models without rejecting the assumptions of the other. These different manners of conceiving and approaching writing are related to differences in the written products. Their work shows that students with low transmissional beliefs and students with high transactional beliefs produced higher quality texts.

In the research described above, the role of beliefs in writing a single text is analyzed. Some studies conducted with secondary education and university students extend these results to tasks that involve writing from multiple texts (Mateos et al., 2011; Miras, Solé & Castells, 2013). These studies examine the relationships between transmissional and transactional reading and writing beliefs and the quality of a written synthesis from multiple texts. It is found that students with more transactional beliefs integrated and better organized the information obtained from different sources. In summary, the research reviewed here supports the idea that transactional beliefs are related to the quality of a written synthesis from multiple texts. Although the influence of students' writing beliefs on their performance in individual writing tasks is a highly promising research field, to the best of our knowledge, to date, this variable has not been investigated in relation to collaborative writing tasks. Therefore, this study aims to explore in this direction. It may be expected that the writing beliefs held by the

members of a group and, more specifically, the transactional beliefs may also to some extent help explain the quality of jointly produced texts.

3. The role of strategies in resolving controversies in group tasks

Johnson and Johnson (2003) study the strategies employed by students to address controversy that arises in the course of a cooperative task. They find that students who used constructive strategies (confirmation, perspective adoption and problem-solving) to a greater extent than destructive strategies (winner-loser, rejection, avoidance) tended to better resolve the controversy. For these authors, constructive strategies lead to the identification of different positions and to their re-conception, integrating elements from each in a creative problem-solving process. By contrast, destructive strategies are developed when students focus on a single perspective and avoid discussion or attempt to impose their view. In the latter scenario, the beneficial learning effects of conflict are lost.

Subsequent studies by the same authors (Johnson & Johnson, 2009; Johnson, Johnson & Monson, 2013) and other researchers (Chen & Tjosvold, 2002) have found empirical evidence of the positive effect of being engaged in a constructive controversy on improving the understanding of the opposite perspectives and on developing an attitude change regarding the issue under discussion.

If constructive strategies imply the adoption and integration of different perspectives to resolve a controversy rather than the rejection or avoidance of alternative perspectives, then it should be possible to postulate that the use of these strategies may influence the writing of a collaborative argumentative synthesis from multiple texts that present different perspectives on a controversial topic.

In addition, a relationship between the use of such constructive strategies and more transactional writing beliefs should also be postulated, insofar as the adoption of these beliefs implies a constructivist epistemological position. In accordance with this position, meaning is neither pre-existent nor pre-determined but instead is constructed during the writing process. In this sense, we can expect individuals who hold transactional beliefs to display a stronger tendency toward adopting integrative problem-solving and perspective-taking strategies when faced with controversy rather than considering that only a single viewpoint exists. To the best of our knowledge, to date, the relationship between strategies for addressing controversy and the quality of an argumentative synthesis jointly written in dyads, on one hand, and the relationship between writing beliefs and strategies for resolving controversies in dyads, on the other hand, has not been investigated.

Based on the assumptions and approach outlined above, the specific aims of the present study are as follows: first, to analyze the role of writing beliefs in influencing the quality of the joint written synthesis; second, to examine the relationships between writing beliefs and the manner in which students resolve the controversies that emerge

during collaborative writing; and, finally, to study the relationship between how students resolve controversies and the quality of their joint syntheses.

The following hypotheses are posed in relation to these aims:
- Hypothesis 1: Students in dyads who hold more transactional writing beliefs will produce a higher-quality synthesis.
- Hypothesis 2: Students in dyads who hold more transactional writing beliefs will tend to use more constructive and less destructive strategies to resolve controversies (hypothesis 2).
- Hypothesis 2: Students in dyads who use more constructive strategies to resolve controversies will produce a higher-quality synthesis.

4. Method

4.1 Participants

The participants were 52 fourth-year psychology students at a state-run university in Madrid, with an average age of 21.7 (45 females and 7 males). They performed the written argumentation task as a voluntary practical activity within the educational psychology curriculum.

We established three levels based on the students' scores on the transactional writing beliefs scale, taking as reference the group average score and its typical deviation (M = 3.79, SD = .40). Students placed in the first level (n = 10) held transactional beliefs below the average score (M = 3.3, SD = .33). The second level comprised students with a transactional belief score close to the average (n = 24) (M = 3.7, SD = .19). Finally, students with above average scores (n = 18) (M = 4.1, SD = .40) were assigned to level 3. The three set groups differed significantly in their average score in transactional writing beliefs ($F(2,51)$ = 24.55, MSe = 2.13, p < .001; η^2 = .50). The Games-Howell post-hoc test revealed that the differences were significant between participants with more transactional beliefs and those with moderate transactional beliefs (p < .001), between participants with moderate transactional beliefs and those with less transactional beliefs (p < .05), and between participants with more transactional beliefs and those with less transactional beliefs (p < .001).

Subsequently, within student groups with the same level of beliefs, random pairs were formed. Doing so gave rise to three student dyad types: high transactional dyads (level 3), moderately transactional dyads (level 2) and low transactional dyads (level 1). Therefore, the high and low denomination was established in relative terms rather than absolute terms; that it, high transactional dyads were the most transactional dyads in our sample, and low transactional dyads were the least transactional dyads in our sample.

4.2   Instruments

Texts for the argumentation task

To perform the argumentative synthesis task from sources with conflicting information on a subject, two texts were prepared with an argumentative structure. Each text argued for a different position on a debated educational issue in Spain: whether or not it is a good thing to have external, standardized assessments of achievement, a subject with which students were generally unfamiliar.

Both texts included an equivalent number of arguments (seven in each text). The arguments of a text could be used as counter-arguments of the arguments advanced by the other text. For instance, one of the arguments contained in one of the texts was "schools are responsible for ensuring the acquisition of basic skills and, therefore, are obliged to verify that this objective is adequately met and, failing this, to make plans for improvement". The second text argued that "standardized assessments do not lead to improvement because, given that the processes are not examined, the underlying causes of the outcome are not known". The length of the first text was 669 words in 7 paragraphs, whereas that of the second was 725 words in 5 paragraphs.

Instrument for assessing writing beliefs

To assess beliefs about writing, the questionnaire by White and Bruning (2005) was administered. This *Writing Beliefs Inventory* consists of 20 items constructed to reflect the writing processes exemplified by transmissional and transactional beliefs. The authors of this instrument conducted one factorial analysis. The inventory was analyzed using principal axis analysis, followed by oblimin and varimax rotations of the factors with Kaiser normalization and then revised (RMSEA = .061; 95% confidence interval, .042 to .07). The results led the authors to propose two subscales; one subscale measures transmissional beliefs (7 items) and the other transactional beliefs (13 items). Transmissional writing belief statements reflect the belief that writing is a way to transmit knowledge about a topic and thus requires lower levels of engagement during the writing process. An example of this scale item is "Writing's main purpose is to give other information". By contrast, transactional writing belief statements reflect the belief that writers transform and integrate their personal knowledge of the topic during the writing process and that this work involves a higher level of engagement; for instance, "My thoughts and ideas become clearer to me as I write and rewrite". Answers were on a five-point Likert scale ranging from "strongly disagree" to "strongly agree". Internal consistencies (Cronbach's alpha) for scores on the Writing Beliefs Inventory were .67and .69 for transmissional and transactional beliefs, respectively.

In this study, we tested the two-writing beliefs model represented by the transmissional and transactional scales through a confirmatory factor analysis (CFA). Considering the small ratio of the sample size to the number of items, we constructed nine parcels (three parcels for the first subscale – the transmissional scale – and five

parcels for the second subscale – the transactional scale). Each parcel was constructed by aggregating two or three items. A preliminary exploratory factor analysis was conducted to form unidimensional parcels within each subscale, following the isolated uniqueness strategy of combining items that share a secondary influence in the same parcel (Hall, Snell & Foust, 1999). The parcels were p1 (2, 7), p2 (1, 4, 5), p3 (3, 6), p4 (9, 13, 19), p5 (11, 15), p6 (12, 20), p7 (8, 12), p8 (14, 17) and p9 (10, 16). Table 1 shows the correlations for the parcels:

Table 1. Correlations matrix for the parcels

Parcel	p1	p2	p3	p4	p5	p6	p7	p8	p9
p1	---								
p2	.27	---							
p3	.40	.57	---						
p4	-.16	-.03	-.07	---					
p5	.13	.33	.01	-.04	---				
p6	.13	.29	.03	.03	.45	---			
p7	.14	.15	-.03	.05	.43	.79	---		
p8	-.19	-.04	-.16	.22	.30	.31	.39	---	
p9	-.19	-.04	-.28	.19	.15	.27	.39	.47	---

Parallel analysis (Horn, 1965) of the parcels correlations suggested 2 factors. CFA showed that the two-factor solution fits (X^2 = 35.824; df = 26: p = .095; RMSEA = .088; CFI = .905; TLI = .869). All of the modification indices were smaller than 10, and almost all of the standardized loadings were significant (p < .01) and larger than .4 (the only exception was for parcel p4, which had a non-significant loading of .062; p = .677). The factors were uncorrelated (r = .022; p = .926). Due to the small sample size, we considered that there was reasonable support for the original model for the writing beliefs inventory, although future research should analyze whether the low loading of parcel p4 is replicated in larger samples.

Instrument for assessing strategies to address controversy

The types of strategies to address controversy arising in the course of the collaborative task were measured using the Controversy Questionnaire developed by Johnson and Johnson (2003). This questionnaire contains two scales for identifying the manner in which students resolve any controversy generated during the performance of a group task (constructive strategies or destructive strategies). In particular, in this study, the questionnaire was contextualized to the specific task of joint writing proposed to the students (see procedure section).

The constructive strategies scale contains 15 items (e.g., "When other disagree with me, I try to see the issue from all points of view") and the destructive strategies scale

another 15 items (e.g., "When I get involved in an argument with others, I become more and more strongly convinced of my own point of view"). The items concerning each of the two scales include statements about different ways of constructive strategies (confirmation, perspective adoption and problem-solving) and destructive strategies (winner-loser, rejection, avoidance). The questionnaire assesses how often students have used each strategy. Answers were on a five-point Likert scale ranging from "1 = never" to "5 = always". As measured by Cronbach's alpha, the reliability score for the constructive strategies scale was .98 and for the destructive strategies scale was .95. The mean scores for the individual items within the scale were calculated.

4.3   Procedure

A single-group prospective *ex post facto* design was used with one independent variable: the dyads' transactional writing beliefs. The dependent variables were as follows: (a) the quality of the synthesis written, implemented through four indicators – the degree of integration attained, the number of relevant arguments, the number of arguments elaborated on and the number of irrelevant ideas included in the texts; and (b) the degree to which constructive and destructive strategies were used in resolving controversies.

The following were used as covariates: (a) the level of integration shown in students' argumentations prior to the task and (b) whether dyad members shared the same position in the debate prior to performing the joint synthesis task.

At the beginning of the semester, the lecturer teaching Psychology of Education submitted a report on this activity as part of the voluntary practical work in the subject. The curriculum, methodology and assessment of this subject are based on a constructivist approach that emphasizes the importance of adopting, contrasting and integrating different perspectives.

In the first session, the *Writing Beliefs Inventory* was administered by one of the researchers in an entire-class session. One week later, in the second session, students (each with their partner) met to perform the task. As described in the section on participants, the students were placed in pairs according to their writing beliefs. In this second session, before the joint synthesis task, each dyad member was given the following pre-task: "Currently, there is an open debate over the convenience of performing standard student progress tests to assess the quality of education. In your opinion, are these exams appropriate? Express your position, and give arguments to support it in writing". In this manner, each student's previous position regarding this issue was explored, making it possible to ascertain whether the dyad members shared an initial position with respect to the debate at hand (i.e., whether members within each pair were in mutual agreement or disagreement). This pre -task did not assess prior ability to compose a synthesis from multiple tests, given that students had to argue its position only from their prior knowledge. Nevertheless, it made it possible to evaluate the initial level of integration between the arguments and counterarguments handled by the students.

Immediately afterwards, students were asked to read two contrasting argumentative texts on the issue to collaboratively write a synthesis. All of the students individually read the two texts in the same order, given that certain information from the first text was necessary to understand the second text. The students were informed that they could read the texts as many times as they wished. The joint written syntheses had to include their conclusions on the topic. These conclusions had to be based on arguments, including the information provided by both texts.

When they had completed the joint written synthesis, they individually answered the *Controversy Questionnaire*. Students only had to answer the questionnaire if they felt that some controversy had arisen while working with their partner. The instructions were as follows: "This questionnaire analyzes certain aspects related to the way you have worked with your partner in the group. In particular, it assesses your behavior during the task when faced with controversy, that is, different opinions on a controversial point, (divergent opinions on the content and/or approach to the task). We ask you to answer only if you feel that some controversy arose while working with your partner". The majority of the students (41 out of 52 participants) answered the questionnaire.

The second session occurred in a lecture room in the presence of the lecturer and lasted two hours.

Scoring: Quality of the written synthesis

The written arguments produced individually (before reading the texts) and the joint written syntheses (after reading the texts) were evaluated according to their degree of integration. Following the strategies that students can use in writing opinion essays established by Nussbaum and Schraw (2007), they were scored on a scale of 1 to 3 on the basis of following criteria:

1. The two positions are not compared to each other. The writer adopts a position and argues only in favor of that position.
2. A position is adopted by answering the opposite position. The writer adopts a position, argues in favor of it and rebuts the arguments on which the opposite position rests. The writer handles arguments from both sides but does so to defend only one of them.
3. Both positions are integrated. The writer considers the arguments and counter-arguments of the different positions and integrates them in a compromise solution between the two (adopts both positions, albeit establishing a hierarchy between them) or indeed proposes a wholly new alternative.

The quality of the written syntheses was also rated according to the following criteria: the number of relevant arguments, the number of arguments elaborated on and the number of irrelevant ideas.

To analyze the number of relevant arguments selected from the source texts, a model was designed for relevant and irrelevant information in each text. The syntheses were classified as (1) if they contained 1 to 4 relevant arguments, that is, up to 25% of the arguments put forward in the source texts; (2) if they included 5 to 7 relevant arguments, i.e., 25-50%; and (3) if they included 8 or more relevant arguments, i.e., 50% or above.

In addition, this study analyzed the number of elaborated arguments, that is, the arguments that had not merely been copied or paraphrased from the source texts but that went beyond the source text; for example, adding a relevant example to illustrate an idea in the text or resuming an argument in the source texts to use it in a different manner.

Finally, the written syntheses were graded according to the number of irrelevant ideas, that is, unnecessary information; they contain: (1) no irrelevant ideas, (2) some (one or two) irrelevant ideas, and (3) three or more irrelevant ideas.

Two independent judges encoded all of the written material. The Kappa statistic was calculated as a measure of inter- rater reliability. The values were: .75 for the degree of integration, .70 for relevant arguments, .85 for arguments elaborated on, and .67 for irrelevant ideas. Disagreements were resolved through discussion.

5. Results

The descriptive statistics and the correlations found among all of the variables in the study are shown in Table 2. The analyses were conducted using disaggregated data.

First, a correlational analysis was conducted to examine the extent of the relations between (a) transactional writing beliefs and the quality of the joint written synthesis (i.e., the degree of integration and the number of relevant arguments, elaborated arguments and irrelevant information employed), (b) transactional writing beliefs and the types of strategies used to address controversy arising in the course of the collaborative writing argumentation task, and (c) the controversy-solving strategies used during the drafting stages of the written synthesis and the quality of the syntheses produced. The Rho Spearman correlation coefficient was used because the measurement level of most of the categories was ordinal. In addition, a one-tailed test was used because we have expectations about the direction of the effect that are in line with our hypothesis.

Table 2. Descriptive statistics and the correlation matrix for the variables in the study

Variables	Mean	SD	Median	Mode	2	3	4	5	6	7	8	9
1. Transactional writing beliefs of the dyads TWR (1-3)	---	---	2	2	.04	.25*	-.02	.17	-.41**	.25	.09	-.18
2. Degree of integration before reading (pre-task) (1-3)	---	----	2	2		.31*	.28*	.35**	-.09	.23	.10	-.41**
3. Degree of integration in joint written synthesis (1-3)	---	---	2	2			.14	.67**	.04	.24	.12	-.29*
4. Relevant arguments in joint written synthesis (1-3)	---	----	2	2				.08	.06	-.19	.20	-.17
5. Arguments elaborated in joint written synthesis (1-4)	2.34	1.21		---					.07	.26*	.03	-.15
6. Irrelevant information in joint written synthesis (1-4)	----	----	1	1						-.39**	-.19	.34**
7. Constructive strategies (1-6)	3.68	.57	---	---							-.11	-.17
8. Destructive strategies (1-3)	1.70	.36	--	---								.10
9. Initial agreement between dyad members over their position regarding the debate (0-1)			0	0								---

Note: Rho Spearman, one-tailed test.*p < .05, **p < .01.

First, a correlation was found between transactional writing beliefs and some dimensions of the quality of the joint written syntheses. In particular, students in dyads who hold more transactional beliefs wrote joint syntheses with greater integration and fewer irrelevant ideas than students in pairs with fewer transactional writing beliefs. Conversely, writing beliefs were not associated with the number of relevant arguments or the degree to which these were elaborated on.

Second, among students in pairs with more transactional writing beliefs, a tendency to employ constructive strategies more frequently during their collaborative writing was observed, although the correlation between the two variables was not significant ($r = .25$, $p = .05$).

Third, constructive controversy resolution was associated with two quality factors in the joint written product. In particular, students who used constructive strategies more frequently produced joint syntheses containing a greater number of elaborated arguments and fewer irrelevant ideas.

By contrast, the use of destructive strategies was not associated with any of the variables in the study.

In addition, the initial level of integration shown by students in justifying their position at the outset of the debate was related to the level of integration of their joint written syntheses and the number of relevant and elaborated arguments that they included. In this regard, students showing greater initial integration before performing the task proceeded to generate higher-quality joint syntheses.

Finally, the initial agreement over the position regarding the debate maintained by the members of each student pair was related to the integration in their joint syntheses and the number of irrelevant ideas therein. Students in pairs who shared an initial position on the debate topic (prior to writing their syntheses) generated syntheses with poorer integration levels and more irrelevant information.

Second, taking the correlations obtained into account and to contrast the role of pairs' writing beliefs in influencing the quality of the joint written synthesis, two ordinal regression analyses were performed. Table 3 presents the distribution of students at different levels of quality of synthesis (ordinal variables), depending on the level of their transactional writing beliefs. In addition, Table 4 includes the average scores of the elaborated arguments and the standard deviations based on the writing beliefs.

In the first regression analysis, the predictive variable was the degree of integration in the joint written synthesis, and the criterion variable was the transactional writing beliefs of the students in the dyads. The following were introduced as covariates: the degree of integration shown by students before performing the task and the initial agreement on the proposed debate between student members of the dyad. The proposed model was significant (Chi-square $_{(4)} = 12.328$, $p < .05$) with a goodness of fit, considering that there were no significant differences between the predicted values and those observed ($p = .19$) (Pseudo-R-square Nagelkerke = .25). The odds of producing higher levels of integration were significantly higher for students with high levels of

transactional beliefs than for those with moderate levels ($e^{1.536} = 4.66$; Wald $_{(1)}$ = 4.81, p <.05).

Table 3. Distribution of students in the different dimensions and levels of quality of their joint writing synthesis according to their transactional writing beliefs

Transactional Writing Beliefs	Students in dyads with low transactional beliefs			Students in dyads with moderate transactional beliefs			Students in dyads with high transactional beliefs		
Dimension/ level of quality	1	2	3	1	2	3	1	2	3
Degree of integration	0%	50%	20%	25%	50%	25%	0%	50%	50%
Relevant arguments	20%	40%	20%	33%	58%	8%	22%	68%	11%
Irrelevant information	20%	40%	40%	75%	25%	0%	78%	22%	0%
N		10			24			18	

Table 4. Means of elaborated arguments and standard deviations for each writing beliefs group

Transactional writing beliefs	N	M	SD
Students in dyads with low transactional Beliefs	10	2.4	1.07
Students in dyads with moderate transactional beliefs	24	2.0	1.18
Students in dyads with high transactional beliefs	18	2.8	1.21

In the second analysis, the variable criterion was the number of irrelevant ideas included in the joint written syntheses. Prior agreement between dyad members regarding the debate presented in the texts was excluded from the analysis after confirming that it did not constitute a significant covariate (Wald $_{(1)}$ = 4.07, p = .05) and that the model generated did not present a good adjustment level (p = .005). The final model, which included students' transactional writing beliefs in dyads as a predictive variable and the initial degree of integration in with which students addressed the task as a covariate, proved to be significant (Chi-square $_{(3)}$ = 16.35, p <.01) with appropriate global adjustment, considering that the critical level (p = .20) indicates no differences between the predicted values and the observed values (Pseudo-R-square Nagelkerke = .33). After controlling for the initial degree of integration, the odds of writing a synthesis

without irrelevant information were significantly higher for students in dyads who manifested more transactional writing beliefs than those with fewer transactional writing beliefs ($e^{3.22}$ = 24.5; Wald $_{(1)}$ = 10.84, p < .01).

Third, to explore in greater depth the trend observed among the transactional writing beliefs held by student pairs and the constructive resolution of controversies, we conducted a secondary Glass analysis (1976). The aim was to examine whether the relationship between said variables could be modulated by the initial agreement or disagreement on the proposed debate with which student pairs addressed the synthesis task. Specifically, an analysis was performed to ascertain whether dyad members with more transactional writing beliefs deployed constructive strategies more frequently than those with fewer transactional writing beliefs in situations that maximized the generation of controversies during the collaborative writing stage (in which members were previously in disagreement over the topic). Table 5 shows the descriptive statistics of the controversy resolution strategies based on students' transactional writing beliefs and the prior agreement of the members of dyads on the topic.

Table 5. Means and standard deviations for the strategies for addressing controversy according to transactional writing beliefs and initial agreement

Strategies to address controversy			Constructive strategies		Destructive strategies	
Initial agreement	Transactional writing beliefs	N	M	SD	M	SD
Disagree	Low transactional	6	3.06	.85	1.62	.49
	Moderate transactional	12	3.73	.54	1.75	.31
	High transactional	7	4.13	.41	1.59	.34
Agree	Low transactional	4	3.80	.14	1.60	.45
	Moderate transactional	8	3.68	.27	1.68	.38
	High transactional	4	3.55	.05	1.98	.27

To that end, an inter-subject 3 (students' transactional writing beliefs in dyads) x 2 (prior agreement) analysis of variance (ANOVA) was conducted. No principal effects were found for any of the variables, students' transactional writing beliefs ($F(2,35)$ = 1.60, MSe = .42, p = .22) or prior agreement ($F(1,35)$ = .025, MSe = .26, p = .87) (see Table 4). However, and as was stated, one significant interaction was observed ($F(2,35)$ = 4.24, MSe = 1.11, $p <$ .05, η^2 = .20): the effect of writing transactional beliefs on generating constructive strategies emerged only when the position previously maintained by the members of the student dyads differed ($F(2,35)$ = 7.13, MSe = 1.86, $p <$ .01, η^2 = .29). The Bonferroni post-hoc test revealed that the students in dyads holding more transactional writing beliefs generated constructive strategies more

frequently than students in dyads with fewer transactional writing beliefs ($p < .01$). We also found that the participants in dyads with moderate transactional beliefs more frequently used constructive strategies than those with fewer transactional beliefs ($p < .05$). By contrast, when students shared their initial position on the debate, no differences were found in the frequency with which the three groups employed constructive strategies $F(2,35) = .27$, $MSe = .07$, $p = .76$). Finally, the student with fewer transactional beliefs employed more constructive strategies when they shared with their partner the starting position on the topic than when they disagreed ($p < .05$). However, students with high and moderate transactional writing beliefs used constructive strategies with equal frequencies in both situations (see Figure 1).
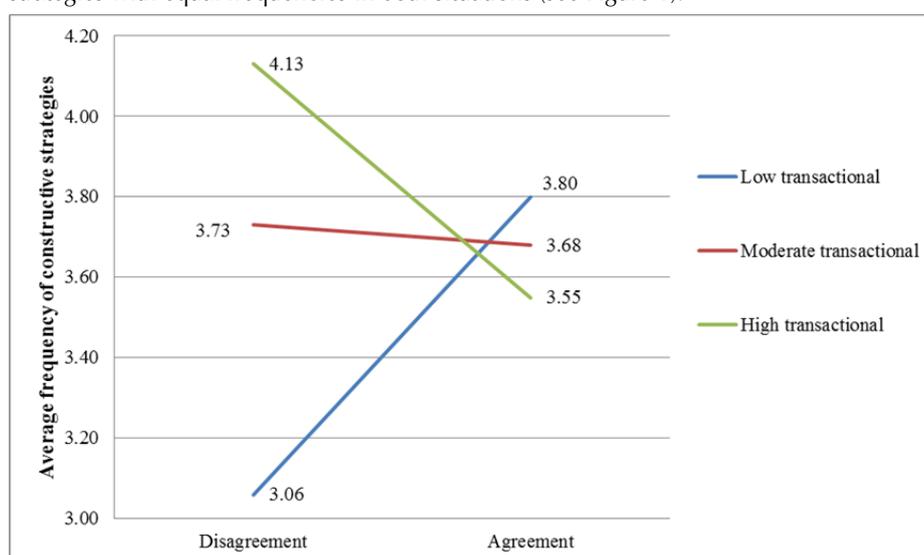

Figure 1. The relationship between dyads' transactional writing beliefs and constructive strategies: The moderating effect of initial agreement.

Finally, from a descriptive perspective, we compared the average frequency with which the students in the sample deployed constructive and destructive resolution strategies to address the controversies generated during the collaborative writing task. In general, the university students resolved the controversies generated during collaborative writing by using constructive strategies more frequently ($M = 3.68$, $SD = .57$) than they used destructive strategies ($M = 1.69$, $SD = .37$) ($t_{student}(40) = -19.25$, $p < .001$). As seen in Table 5, all of the students reported a low frequency of use of destructive strategies during the task. No significant differences were found in terms of writing beliefs ($F(1,35) = .56$, $MSe = .08$, $p = .57$) or prior agreement regarding the topic among the student pairs ($F(1,35) = .64$, $MSe = .09$, $p = .43$). Similarly, no significant interaction was observed between these variables ($F(1,35) = 1.39$, $MSe = .19$, $p = .08$).

6. Discussion

The aims of our paper were, first, to analyze the relationships between transactional writing beliefs and (a) the quality of a joint written synthesis based on two texts presenting conflicting perspectives on the same topic and (b) the strategies employed by students in dyads to address controversy. Second, the present study sought to examine the relationship between the strategies for addressing controversy and the quality of the joint written synthesis.

With regard to the first aim, the results partially support our expectations. First, as expected (hypothesis 1), the correlations obtained and the results of the regression analyses showed that the students in dyads with more transactional writing beliefs produced higher-quality joint written syntheses.

On one hand, transactional writing beliefs, the initial agreement among dyad members regarding the debate, and the initial degree of integration contributed to explaining the level of integration in the joint syntheses. As in other studies conducted with university students (Nussbaum & Schraw, 2007), in this study, the majority of the students wrote persuasive essays. They drafted syntheses with an intermediate degree of integration, in which they included both sides of the debate but only argued in favor of one side while refuting the opposite position. Nevertheless, the students in dyads holding more transactional writing beliefs wrote syntheses combining the arguments and counter-arguments of the different positions and integrating them into an overall final position to a greater extent than those with fewer transactional writing beliefs. This result is in line with and extends the findings of previous studies that revealed the role played by writing beliefs in the quality of individually written syntheses. It was found that students with more transactional beliefs integrated and better organized the complementary information obtained from the different sources (Miras, Solé & Castells, 2013; Villalón et al., 2015). Similarly, these results are coherent with those obtained in the field of research on the role of epistemological beliefs in understanding multiple texts (Bråten, Britt, Stromso & Rouet, 2011; Gil, Bråten, Vidal-Abarca & Stromso, 2010). Gil et al. (2010) find that, when university students read up to debate on texts containing opposing views on a subject, those with more sophisticated epistemological beliefs perform deeper processes and gain intertextual inferences that require the information gathered from multiple sources to be handled in an integrated manner.

On the other hand, and in keeping with the results obtained from other educational levels such as secondary education (Villalón et al., 2015), conceiving writing as a knowledge-building tool favored the selection of information from the diverse sources, thus improving the quality of the syntheses. In our study, students in dyads with more transactional writing beliefs, rather than those with fewer transactional writing beliefs, made a better selection of the information. No differences were observed in the number of relevant arguments included in their syntheses, but the amount of irrelevant (or unnecessary) information was smaller. Finally, and in contrast to the study by White and Bruning (2005), we did not observe any link between transactional writing beliefs and students' elaborations. This result may possibly be related to both the demands of

the task and the nature of the given texts. In the study by White and Bruning, after reading a narrative text, the students were asked to write an essay in which they discussed the possible meanings of the text, made personal comments and performed a critical evaluation of the text that they had read. The task designed in their study contained the explicit requirement to write a text with a higher level of personal implication, thus favoring more elaborate content. Moreover, in our study, students were not familiar with the topic, a factor liable to make elaboration more difficult (Boscolo & Mason, 2003). Furthermore, in our study, students were presented with a task oriented toward eliciting a synthesis containing their conclusions on the subject, without straying from the references to the information given in the source texts. In other words, students were guided toward integrating the intertextual information rather than toward elaborating on it on the basis of prior knowledge. These conditions may have minimized the effect of writing beliefs on the elaboration of arguments. Similarly, this factor may also be one of the reasons for the low average of elaborated arguments.

Next, as advanced in hypothesis 2, transactional writing beliefs were associated with constructive strategies for addressing controversy. In particular, when students of a dyad did not hold a common position prior to the debate, those with more transactional writing beliefs resolved their controversies by deploying constructive strategies more often. As noted by Johnson and Johnson (2003, 2009), using constructive strategies to resolve the controversies generated during a task requires an epistemic approach, which implies the active search for more information and understanding and integrating opposing positions and rationales. Insofar as maintaining transactional beliefs implies perceiving writing as a knowledge-building process, we can assume that said beliefs predispose students to the joint building of ideas. According to Onrubia and Engel (2009, p.1257), the "co-construction of knowledge implies that meanings are extended, deepened or transformed because participants build on each other's contributions throughout the whole writing process".

Finally, with regard to hypothesis 3, students who used constructive strategies more often generated joint syntheses containing more elaborate arguments and fewer irrelevant ideas. In line with all of the above, constructive controversy resolution demands inter-psychological processes that favor the joint construction of representations of the content and/or the task. According to Johnson and Johnson (2003), students who resolve controversies in a constructive manner explore, extend and integrate the different arguments and counter-arguments advanced by others. In our study, the use of constructive strategies was associated with quality criteria relative to the selection and elaboration of information but not with the degree of integration. Contrary to expectations, the students more frequently involved in constructive controversy resolution did not generate more integrated syntheses (with greater levels of integration between arguments and counter-arguments) than their peers. It is not easy to interpret this result, given that the use of constructive strategies would involve synthesizing and integrating the best arguments from all sides. One possible explanation may be that this advance occurred during the dyad's discussion stage but

was not subsequently reflected in the written outcome. In other studies (Solé, Miras, Castells, Espino & Minguela, 2013) that investigated the relationships between the processes and the product of drafting syntheses from given sources in individual writing tasks, some of the integrations made during the first and second readings of the source text were not transferred to the written work produced by the students.

Therefore, our findings should be studied in greater depth by means of qualitative studies to enable understanding the difficulties in textualization experienced by the student dyads with different writing beliefs. Furthermore, we are aware of the limitations inherent to the use of a retrospective self-report. For this reason, it would be useful to compare our results concerning strategies for addressing controversy with the results of an analysis of the collaboration processes observed while the students were performing the task and to analyze the relationships between constructive strategies and students' interaction patterns (Wigglesworth & Storch, 2012).

A second limitation of our study was the reliability of the questionnaire used to evaluate the writing beliefs. Although the results of the CFA showed a reasonable fit to the theoretical model, it may be necessary to conduct new validation studies with larger samples.

The sample size entailed a further limitation. On one hand, it did not make it possible to simultaneously contrast the possible relationships between the three variables considered in the study (i.e., transactional writing beliefs, agreement/disagreement among members of the dyad on the previous position and strategies for controversy resolution) and their effect on the quality of the synthesis.

On the other hand, and associated with the fact that our study combined individual measures (e.g., the degree of integration in the pre -task, strategies for addressing controversy) and group measures (e.g., the quality of the synthesis written by the dyads, the initial agreement between dyad members on their position regarding the debate, the pairs' writing beliefs), we decided to analyze disaggregated data.

The disaggregated data may have contributed to increasing the effect size found, but even in this case, the small size of the sample could have mitigated this problem. Therefore, it would be appropriate to replicate this study with larger samples that allowed contrasting the effects of both types of variables on the quality of the joint syntheses by using aggregated data, provided that they met the criteria for aggregation (Burke, Finkelstein & Dusig, 1999; Chan, 1998; Kozlowski & Klein, 2000). Another option with a larger sample would be to extend this study to simultaneously contrast the weight and the relationship between the individual and group variables analyzed here through a structural equation model.

Despite the limitations outlined above, the findings of this study suggest that students with higher levels of transactional beliefs are likely to be involved in more productive interactions with their peers in collaborative writing tasks and to produce higher-quality syntheses with these partners. It would be interesting for future studies to expand the objectives of our research to analyze the benefits of collaborative writing over individual writing in such types of tasks and thus deepen the knowledge about the

role of writing beliefs in both types of structures. In this regard, a control group in which students individually performed the same synthesis task could be included in a future design.

Certain educational implications can be derived from the results obtained in our work. The first of these is the importance of asking students to write these types of tasks. Identifying the ideas that writers want to include in a synthesis, deciding about organization and structure in a new text, and integrating the selected information are fundamental for the education of reflective and critical citizens. Second, it seems essential to include a reflection on writing beliefs in academic literary. Even when students are being asked to complete tasks that involve writing a synthesis from multiple source texts that present contradictory information on a subject, it is not sufficient to teach the processes inherent to argumentative writing. It is necessary to explicitly analyze how to conceive of writing with a transactional approach. Moreover, we should stress the need to teach constructive methods of resolving controversies. Confronting students with collaborative writing tasks does not guarantee that they will be able to use strategies for confirmation, perspective adoption and problem-solving. It seems that students need to be made aware of their beliefs and trained in these collaborative procedures.

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