1 **ORIGINAL RESEARCH**

2 Teaching argumentative synthesis writing
3 through deliberative dialogues: instructional practices
4 in secondary education

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10 **Abstract**
11 Dialogical argumentation practice contributes positively to argumentative writing skills.
12 Specifically, deliberative dialogues are effective in promoting argument and counterargu-
13 ment integration in students' essays. However, the potential of dialogic activities may be
14 increased if they are combined with instructional practices. The primary objective of this
15 research is to compare the impact of four intervention programs, aimed at improving argu-
16 mentative synthesis writing from conflicting sources. The four programs resulted from the
17 combination of two instructional components (Explicit Instruction through video model-
18 ling—EI, or a Procedural Guideline—G), while Deliberative Dialogues—DD—were a
19 constant element. We conducted a pre-post quasi-experimental study in which 186 Spanish
20 third grade secondary school students (aged 14–15) participated. We evaluated the quality
21 of the syntheses by examining the level of argumentative coverage (the total number of
22 arguments included in the synthesis) and the level of integration (the type and frequency
23 of the argumentative strategies used in the syntheses). The results showed that the effec-
24 tiveness of the instructional methods varies according to the synthesis quality indicator.
25 Explicit instruction, in combination with deliberative dialogues, was especially helpful in
26 improving the level of integration of syntheses. The procedural guideline, in combination
27 with deliberative dialogues, contributed significantly to the coverage of arguments. The
28 combination of these two elements did not favor the writing of synthesis as expected, prob-
29 ably due to the conditions in which the intervention was carried out. The findings of this
30 study revealed that the coverage of arguments and integration processes are of different
31 nature, follow different learning paths and require different instructional processes.

32 **Keywords** Secondary education · Argumentation · Deliberative discussions · Written
33 synthesis

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Contemporary society is characterised by its ease of access to a large amount of data. Digitisation, as one of the features of the twenty-first century, has maximised the flow of information to which we are exposed. The ability to think critically is thus an indispensable objective in the school curriculum (OECD, 2018). Critical thinking and argumentation are intimately linked. To argue effectively it is essential to recognise the existence of different positions on a topic, and to select the main arguments linked to each perspective in order to contrast, evaluate and integrate them (Kuhn, 2005).

Argumentation is a typically human cognitive activity (Rapanta et al., 2013), because it requires linguistic command. The ability to understand an argument emerges at around the age of three. Argument skills increase between childhood and adolescence (Kuhn & Udell, 2003). Several studies, however, have revealed the poor performance of secondary school students in argumentative tasks in various respects. Reznitskya et al. (2001), for instance, showed how adolescent students have difficulties writing persuasive essays. The authors showed a tendency to argue in favour of their own thesis, omitting arguments and evidence for that challenge. Such studies suggest that expertise in argumentation does not occur spontaneously. Although students acquire basic argumentation skills at an early age, schooling is essential. It is therefore necessary to design learning environments that support their development (Schwarz, 2009).

There is a growing consensus among educational researchers that dialogical argumentation practice contributes positively to the development of argumentative skills in teenagers (Crowell & Kuhn, 2014). Dialogic and individual argumentation are closely connected (Kuhn et al., 2016). Changes in oral argumentation skills have been shown to transfer to written performance (Felton et al., 2009; Reznitskaya et al., 2001). Additionally, discourse goals have a direct influence on the individual texts produced after arguing. Deliberative discussions are defined as discussions in which the goal is to reconcile opposite positions about a controversial issue, by reaching a collaborative, reasoned and integrative conclusion. As with persuasion dialogue, deliberative discussions include a phase in which the participants introduce and critically examine opposing arguments. However, deliberative dialogue involves an additional activity in the argumentation stage, which Walton called 'revision', whereby the proposals and perspectives are adapted in the light of incoming arguments and evidence (Walton, 2010). Deliberative discussions, compared with discourses where the aim is to persuade, mitigate my-side bias and promote greater argument-counterargument integration in individual essays elaborated after the discussions (Felton et al., 2015a, 2015b). Argument-counterargument integration involves connecting the different perspectives, and seeking a way to reconcile the positions.

This study arose as a didactic proposal to further dimensions of argumentative competence in secondary school students. The intervention is based on participation in deliberative discussions in order to promote individual argumentative writing skills. More specifically, the intervention is focused on skills related to argumentative synthesis writing (Mateos et al., 2018). This task involves reading different sources that offer conflicting viewpoints about a controversial issue, in order to explore, select, contrast, and integrate (in writing) the arguments that support the different points of view in a balanced way. We chose this modality of argumentative writing because of its epistemic value and it shares many of the foundations of deliberative dialogues. In order to support the potential of these dialogic activities, the intervention includes other instructional practices.

Deliberative dialogue versus persuasive dialogue to enhance argumentative skills

Argumentative dialogue plays a central role in thinking and learning (Asterhan & Schwarz, 2016). It must be understood as the dialogical context for an exchange of views. Social interaction provides opportunities for exposure to the alternative arguments that are generated, thereby increasing our access to ideas and information. This process in turn allows us to develop more reasoned, refined, and robust conclusions (Leitão, 2000). Social interactions also have an impact on individual cognition. The exercise of exposing one's perspective, clearing up misunderstandings during the discussion and challenging other points of view, contribute positively to individual cognitive skills (Resnick et al., 2015). Similarly, social interaction through dialogue can affect individual argumentative writing processes positively (Kuhn et al., 2016). Several interventions developed in academic contexts have shown the transfer of the dialogic activities to individual writing tasks (Crowell & Kuhn, 2011, 2014; Litosseliti et al., 2005; Reznitskaya et al., 2001).

According to Walton (2010), argumentative dialogues can be categorised into different types, depending on the discourse goals. The adequacy of the dialogue has to be judged in relation to the discourse aim. For example, if the main goal of the discussion is to persuade others and to support explanations with the strongest evidence, then the best approach is persuasive dialogue. Conversely, if in a given situation the most prudent action is to decide collaboratively, then deliberative dialogue is the best choice. Deliberative dialogue is related to other modalities of academic discourse such as exploratory talk (Mercer, 2002), enquiry dialogue (Reznitskaya & Wilkinson, 2017), collaborative reasoning (Chinn et al., 2001), collaborative argumentation (Nussbaum, 2008a), and the constructive controversy (Morais et al., 2017). Despite differences due to the theoretical framework and the methodology used in these studies, the similarities point to the foundations of the discourses. Specifically, deliberative dialogue aims at exploring different perspectives on a topic, to reconcile the positions and reach a collaborative, reasoned and well-founded conclusion.

There is evidence of a better quality of argumentative reasoning when students are asked to collaborate towards a common solution, rather than to convince others that their idea is better (Felton et al., 2019). During deliberative dialogue, students are involved in the elaboration of arguments with their peers, and they examine the different claims in depth (Felton et al., 2015a, 2015b). Deliberative dialogues, compared to persuasive dialogues, also help students to elaborate two-sided essays i.e. texts, which involve argument-counterargument integration, mitigating the effects of confirmation-bias (Felton et al., 2009; Villarroel et al., 2016). Despite the aforementioned benefits of deliberative dialogues, traditional adversarial debates continue to predominate in Spanish educational contexts.

Argumentative synthesis writing from multiple and contradictory sources: features and similarities with deliberative dialogues

Controversy is present in many debatable topics. The issues that individuals argue about typically admit different positions and, on some occasions, these positions can appear antagonistic. The term 'argument-counterargument integration' was proposed by Nussbaum and Schraw (2007), and refers to the argument schema by which individuals not only provide reasons for one side of a controversial issue, but also acknowledge and reply to

125 the arguments on the other side, i.e. the counterarguments. These authors identified three
126 strategies for constructing an integrative argument. Refutation, which is considered the
127 least integrative strategy, consists of showing that the conclusion derived from the counter-
128 argument is false, or that the counterargument is weak. Another integrative strategy, which
129 Nussbaum and Schraw (2007) called 'synthesis', would involve arguing by proposing some
130 action that eliminates or minimises the problem. This strategy was subsequently redefined
131 as the construction of a design claim (Nussbaum & Edwards, 2011; Nussbaum & Putney,
132 2020), that is, a claim regarding how the solution should be designed. Design claim argu-
133 ments are integrative as they retain the benefits of an alternative, while reducing the nega-
134 tive consequences mentioned in a counterargument. The third integrative strategy identified
135 by Nussbaum and Schraw (2007) was weighting, which implies showing that the benefits
136 of a course of action outweigh the negative consequences. Although the refutation strat-
137 egy allows the problem space to be explored, it does not encourage two sided-reasoning as
138 much as weighting or synthesis/designing claims, which are much more integrative strate-
139 gies (Felton et al., 2009; Nussbaum & Schraw, 2007). Weighting and synthesis/designing
140 claims are predominant strategies in reflective writing (Nussbaum, 2008b), where the pur-
141 pose is to explore and to integrate different perspectives so as to reach a reasoned conclu-
142 sion about an issue.

143 Argumentative syntheses are writing tasks characterised by argument-counterargument
144 integration (Mateos et al., 2018), and they can be seen as a prototype of reflective writ-
145 ing. According to Mateos et al. (2018), argumentative synthesis writing from different and
146 conflicting sources can be understood as a modality of writing a reflective essay, with the
147 aim of considering both sides of a controversy in order to reach an integrative solution. As
148 a result of the contradictory nature of the information presented by the sources, it is neces-
149 sary to recognise the conflicts, contrast the different points of view and solve the contradic-
150 tions by integrating the positions. These strategies facilitate the resolution of the cognitive
151 conflict, promoting a greater understanding of the sources and their connections (Barzilai
152 et al., 2018). Argumentative syntheses are also hybrid tasks (Spivey, 1997), since they
153 involve reading and writing processes. They require, on the one hand, organising, selecting,
154 and connecting information from different texts to compose a new original text with spe-
155 cific structure and content (Segev-Miller, 2007; Spivey, 1997) and, on the other hand, inte-
156 grating arguments and counterarguments (Nussbaum, 2008a). Such writing tasks, accord-
157 ing to their epistemic nature, promote knowledge construction and perspectivism (Mateos
158 et al., 2014; Nelson, 2008).

159 It is worth mentioning that although argumentative syntheses are written products, inso-
160 far as they are considered a modality of argumentative reflective essay based on the reading
161 of contradictory sources, they mobilise processes similar to those that take place during
162 deliberative dialogues. The writing of the synthesis also requires a process of dialogue, but
163 with the sources. It is an intrapersonal argumentative process through which one's opin-
164 ion is contrasted with the information presented in the texts. Successful performance in an
165 argumentative synthesis task implies, as in an effective deliberative dialogue (Felton et al.,
166 2019), exploring both sides of the topic, in order to reconcile the positions, and reaching an
167 integrative well-founded conclusion. The added components of the syntheses are the read-
168 ing and writing processes involved, which enhance the epistemic potential of this activ-
169 ity. Although argumentative syntheses stand out for their educational value, they are rare
170 activities in Spanish secondary education (Solé et al., 2005). When students are faced with
171 synthesis writing tasks, they have trouble completing them successfully (González-Lamas
172 et al., 2016). Consequently, it is necessary to design and test intervention programs to teach
173 students how to write argumentative synthesis based on contradictory sources.

Instructional practices to improve argumentative writing and argumentative synthesis writing

From a sociocultural perspective, argumentation is a social practice, and argumentative literacy should be promoted through active participation in dialogic interactions. From a cognitive perspective, however, the development of argumentative skills requires an explicit teaching process, through which self-regulation and writing strategies are acquired. According to Ferreti and Lewis (2013), these two theoretical approaches can be complemented when designing interventions to improve argumentative writing. They argue that dialogic interactions may enhance effective argumentative writing when these interactions are supported by graphic representational tools, and explicit instruction. Graphic organizers such as tables or maps can be helpful to externalize and explain claims and arguments (Nussbaum & Schraw, 2007). Explicit instruction, such as modelling the processes involved in writing, may increase understanding and awareness of the task and, therefore, greater self-regulation. Explicit instruction based on the self-regulated strategy development (SRSD) model (Graham & Perin, 2007; Graham et al., 2013) has shown good results in argumentative writing interventions.

On the basis of Ferreti and Lewis' (2003) ideas about the complementarity of dialogic approaches and explicit instruction when teaching how to write argumentative texts (Ferreti & Lewis, 2013), several studies have been conducted to teach argumentative synthesis writing at different educational levels. González-Lamas et al. (2016) conducted a study with secondary school students, in which they assessed the efficacy of an intervention program based on teaching cognitive and self-regulation strategies, to improve argumentative synthesis writing. The results showed that the teaching of cognitive and self-regulation strategies, through a video modelling session and the support of a procedural guideline, enabled the students to integrate arguments and counterarguments. In the context of higher education, Mateos et al. (2018) conducted a study in which undergraduate psychology students were taught to write argumentative synthesis from conflicting sources. The intervention included two teaching conditions: the explicit instruction of a procedural guideline using video-modelling, and the self-study of the procedural guideline. After the instruction session, the students in both groups practiced collaboratively writing synthesis texts over two sessions, with access to the procedural guideline. An analysis of the individual pre- and post-test syntheses revealed better results in the condition that included explicit instruction in two variables related to the quality of the synthesis: coverage of arguments and level of integration. The authors subsequently developed a secondary analysis of the data derived from this study (Mateos et al., 2020). The secondary analysis included the scores from the written synthesis produced during the two sessions of collaborative practice. The data for all time points i.e. pre-test, post-test, and the two collaborative practice sessions, was analyzed using structural equation modelling (SEM) to test whether explicit instruction directly or indirectly affected the two indicators of good argumentative synthesis texts—coverage of arguments and integration—via the collaborative practice. The results showed two different learning paths for both dependent variables. Explicit instruction was effective for both variables, while collaborative practice only had an additional indirect effect on the coverage of arguments. In higher education, Granado-Peinado et al. (2019) studied the impact of an intervention program that included collaborative practice and a procedural guideline, supported by explicit instruction aimed at improving collaboration and the writing of argumentative syntheses. This program was compared with three other programs in which the help provided was progressively reduced, i.e. explicit

instruction with video-modelling, the procedural guideline and collaborative practice. The results indicated that the explicit instruction component resulted in a more integrative synthesis and in a higher proportion of identified arguments in their final texts. When students received explicit instruction not only regarding writing synthesis, but also about how to collaborate, they elaborated syntheses with a higher level of integration. However, explicit instruction that focused solely on helping students to write argumentative syntheses turned out to be as effective in producing a high level of arguments as the help directed at collaboration.

This study

The study reported in this paper aims to shed light on the effectiveness of deliberative dialogues, when they are complemented with different instructional aids, to teach secondary school students to write argumentative syntheses. There is evidence about the positive effect of dialogues on argumentative writing (Crowell & Kuhn, 2011, 2014; Kuhn et al., 2016; Litosseliti et al., 2005; Reznitskaya et al., 2001), especially when the dialogues are used with a deliberative rather than persuasive goal (Felton et al., 2009, 2015b, 2019; Villarroel et al., 2016). Nevertheless, there are no known intervention programs in which deliberative dialogues are used to promote a particular type of argumentative writing: i.e. argumentative syntheses from conflicting sources.

Programs developed to date that are aimed improving argumentative synthesis writing (González-Lamas et al., 2016; Granado-Peinado et al., 2019; Mateos et al., 2018, 2020) have traditionally included a collaborative practice component, whereby students work in pairs to develop argumentative synthesis writing tasks. However, there is no previous research where the authors have tested the effect of combining different instructional methods, with practice based on group discussion activities in real classroom contexts. Furthermore, previous studies in the field have incorporated two types of instructional aids: (1) explicit instruction through video-modelling, and (2) a procedural guideline. The most complete intervention modality has always included the explicit instruction component in combination with the procedural guideline. This condition in turn, has always been compared to the use of the procedural guideline without any instruction. This characteristic of the design of the studies does not enable the effectiveness of the instructional aids to be evaluated separately. Specifically, the research carried out to date does not offer an analysis of the effectiveness of explicit instruction, when it has not been complemented by the procedural guideline. Moreover, none of these studies has used structural equation modelling (SEM) to analyse how the relationships between pre-test, post-test, and the practice sessions change, depending on the type of instructional help provided. Mateos et al. (2020) only analysed these relationships when the teaching consisted of combining explicit instruction with the procedural guideline. Combining multiple aids in a single instruction package makes it difficult to analyse the contribution of each component to the writing process. Therefore, one of the main objectives of our study is the decomposition of programs into their individual elements, in order to evaluate their effectiveness separately and in combination.

On the other hand, the deliberative dialogues included in our study differ considerably from those conducted in other research in the field (Felton et al., 2009, 2015b, 2019; Villarroel et al., 2016). Firstly, they are not developed in pairs, but in small groups of students. Secondly, the dialogues on the same subject are articulated in two phases. In the first phase, discussions

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are developed in small groups of students, within which there is a designated leader. In the second phase, the leaders of the respective groups develop the discussion, while the other classmates observe (the observers). This way of approaching dialogic activity differs from the type of collaborative practice that has traditionally been used in interventions to teach argumentative synthesis writing, however, it is a common methodology in classrooms. Students often start by working in cooperative groups and later the results of each team are discussed with the whole class. Similarly, the organisation of the dialogues in two phases is based on the theoretical idea that recursion is a useful and powerful problem-solving strategy (Levy, 2001; Sooriamurthi, 2001). The different moments of discussion on the same dilemmatic question could thus generate a positive recursion in the process of searching for integrative solutions to the controversies.

Within this context, the general objective of this study is to implement and evaluate four intervention programs aimed at teaching secondary school students to write argumentative syntheses. The intervention programs include deliberative dialogue activities as a core component, which are preceded by different instructional practices. In particular, the specific objectives are to:

1. Assess the effect of different instructional practices (explicit instruction through video modelling in combination with a procedural guideline; explicit instruction through video modelling; a procedural guideline; absence of instruction) on the quality of the syntheses. The two indicators of good argumentative synthesis texts are the level of argument-counterargument integration and the coverage of arguments from the sources.
2. Explore the learning paths, the relationships between several texts elaborated throughout the intervention, for both indicators of argumentative synthesis quality, depending on the different instructional practices, and depending on the role of the students in the second phase of the discussions (leaders *vs.* observers).

In keeping with these objectives, the initial hypotheses are as follows:

1. All four intervention programs will be effective in terms of improving the students' abilities to write argumentative syntheses; i.e. all participants will write higher quality syntheses at the end of the intervention, compared with their initial products. However, the students who receive the most comprehensive instructional program, the program that combines explicit instruction with the procedural guideline, will make the most progress in synthesis writing. We therefore expect an additive effect from these components when they are presented together in the same instructional program. Additionally, students who receive only the explicit instruction will advance more in synthesis writing than the students who receive only the procedural guideline.
2. We expect two different learning paths for both quality indicators of the syntheses (integration level and coverage of arguments), however, as there is no precedent in the literature, we do not have hypotheses for how the learning paths will vary depending on the different instructional practices, nor on the effect of the role of the students.

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Method

Participants

The participants in this study included 216 students from eight complete third form classes (aged 14–15), in three Spanish secondary schools (School A: four classes; School B: three classes; School C: one class). The classes were distributed between four intervention programs, which will be described later. The assignment of the classes to the four intervention programs was carried out taking into account the performance of the students in the subject Spanish language. This variable was unexpectedly related to the intervention's results in a pilot study, with which we intended to test the validity of the materials for the present study. Therefore, this result led us to consider the scores of the participants in Spanish language to address the equivalence of the intervention groups. Prior to implementation, we ensured that student assignment had resulted in intervention programs in which there was an equivalent ratio of students scoring high and low in this subject. We later verified through statistical analysis that the mean scores of the students in the different programs did not differ significantly regarding this variable (F (3, 183) = 1.01; p = 0.39). The students and their legal guardians were asked to sign an informed consent document before participation in the study. Throughout the intervention, sample loss occurred. Of the 216 students who initially agreed to participate in the study, and whose parents had consented, 30 students did not attend all the intervention sessions. These students were excluded from the analysis. Therefore, the final sample consisted of 186 participants.

Instruments and materials

Intervention programs

We created four intervention programs, based on the combination of two instructional components—explicit instruction through video modelling (EI-component), and procedural guideline (G-component). The most complete program, DD + G + EI, included both elements and addressed the processes implied in reaching integrative solutions during deliberative discussions about controversies, with the additional support of the procedural guideline. The second program, DD + EI, included instruction about the integration processes through video modelling, but without the support of the external tool. The third program, DD + G, involved the use of the procedural guideline throughout, without any explicit instruction. Finally, in the fourth program, DD, the students received neither explicit instruction nor the support of the procedural guideline. Participation in several deliberative discussions about controversial socio-scientific topics was a common element in all the programs. The intervention programs and their components are detailed in Table 1.

Explicit instruction (EI)

The component of explicit instruction was adapted from Mateos et al. (2018). The objectives of this instruction were: (1) to teach the students how to achieve comprehensive solutions when opposing positions, presented through several sources, are discussed,

Table 1 Components included in the intervention programs

	Components		
	Explicit instruction through video modelling	Procedural guideline	Participation in deliberative dialogues
DD+G+EI	X	X	X
DD+EI	X		X
DD+G		X	X
DD			X

and (2) to train the students in writing integrative conclusions related to the controversies. We developed a seven-step procedure to achieve these aims. The first step involved the reading of contrary texts on controversial topics. The second step involved ways of identifying the topic under discussion and relating it to the student's own ideas on the topic. The third step showed them how to identify the arguments and counterarguments of each position. The fourth step showed them how to compare and contrast both positions by analysing the relationships between the arguments and counterarguments, and how to identify whether some arguments were more relevant than others. The fifth step consisted of reaching an integrative conclusion, looking for solutions to the controversies, i.e. those proposals that support the issue in question, and minimising the inconveniences mentioned by the detractors. The sixth step focused on organising their ideas and to transfer them to the written text. Lastly, the seventh step involved revising the written text. Although the steps are presented in a linear way for didactic reasons, the recursive nature of the process was explained to the students.

Instead of using a traditional method to provide explicit instruction to our participants, we employed the video modelling strategy. We recruited four volunteers who were the same age as the study participants to simulate an expert discussion task. To guarantee a good performance, we provided them with a script in which four people discussed the advantages and disadvantages of alternative medicine. The discussion script reflected all the interactions corresponding to the seven stages of the explicit instructional process and their correct execution. The volunteers memorised the script and performed it while we videotaped them. We also asked volunteers to conduct two versions of the discussion; one version for the program in which the explicit instruction was combined with the procedural guideline (DD+G+EI), and another version for the program in which the only help was the explicit instruction (DD+EI). In the video recorded for DD+G+EI program, the volunteers held a discussion with the additional support of a procedural guideline that explained the stages comprised in the instructional process. Conversely, in the video recorded for the DD+EI program, the volunteers developed the same discussion, but without any support tool. Both videos were later edited to facilitate the future modelling process with our students. We included titles for each of the steps, in order to focus the students' attention on the strategy being modelled in each phase. The explicit instruction based on the videos is attached in Appendix 1.

Procedural guideline (G)

The procedural guideline, a text with procedural steps and graphic organisers, was adapted from previous studies (Mateos et al., 2018). The procedural guideline is an interactive tool,

since it invites participants to answer questions by filling in the gaps, to complete graphical devices such as a table showing where to list the arguments and counterarguments, and to add arrows to establish the relationships between these arguments and counterarguments. The procedural guideline comprised five sections, each of which focused on a different stage of the process: (a) exploring and identifying the arguments from both positions (this section included a table with separate columns to add the arguments from both positions), (b) contrasting positions (this section included a text box with strategies to establish relationships between the positions; for example, weighting or refuting strategies), (c) reaching an integrative conclusion through group discussion (this section included questions like *"Is there any way to reconcile the two positions?"),* (d) writing the integrative conclusion agreed by the group (this section included questions such as *"Is it better to start with the strongest argument or leave it for the end of the text?")*, and (d) revising the final draft (this section included questions such as *"Has the conclusion of the group been clearly expressed in the text?").* The complete procedural guideline is attached as Appendix 2.

Argumentative exercises

We elaborated a set of exercises, similar to those used in school to teach argumentation in a traditional way. These exercises consisted of answering several questions about two opinion articles published in a national newspaper. Some examples of questions are: *What is the topic of the articles? What audience are the texts aimed at? If you had to give them a title, what would it be? What are the characteristics of the vocabulary of the texts?* The set of argumentative exercises is attached in Appendix 3.

Practice in small group discussions

Group discussions were articulated in two phases. In the first phase, students were organised in small groups of 4–5, heterogeneously composed based on the linguistic competence of the students. These groups read controversial socio-scientific texts, discussed these texts, reached integrative solutions considering both sides of the topic, and wrote down the agreed conclusion. A student was designated as leader within the groups, following the recommendations of the class teacher. These leaders had to be skilled in three tasks: leading groups, managing time, and actively participating in classroom dynamics. The students who had been designated as group leaders participated in the second phase of discussion, which aimed to reach an even more integrative solution based on the conclusions generated by the groups they represented. When the leaders discussed the outcomes from their respective groups, the other students in the class observed the discussion.

Texts for the argumentative synthesis tasks and for discussion activities

Four pairs of argumentative texts were created. Two pairs were in a balanced design administered for the individual synthesis-writing task i.e. pre- and post-test. The other two pairs were used in the discussion activities. Each pair of texts provided conflicting information about a controversial socio-scientific topic, representing a position in favour and another against the debate in question. The topics were the risks and benefits of nuclear energy, transgenic foods, embryonic stem cell research and plastic materials. The texts were equivalent in structure, length of between 700 and 780 words, and a number of arguments (6) and counterarguments (6) per text.

Table 2 Session synthesis in each intervention program

	Intervention programs			
	DD + G + EI	DD + EI	DD + G	DD
Session 1: pre-test	Individual synthesis task			
Session 2: instruction				
Video modelling integration processes	+	+		
Instructions to use the procedural guideline	+		+	
No instruction: argumentative exercises				+
Session 3–6: practice in deliberative small group discussions				
Session 3: topic 1	All participants			
Session 4:	Leaders			
Session 5: topic 2	All participants			
Session 6:	Leaders			
Session 7: post-test	Individual synthesis task			

Design and implementation

We set up a pre-post quasi-experimental study. The classes were assigned to the intervention conditions as a whole. The intervention's design included two independent variables: the intervention program, with four levels (DD + G + EI; DD + EI; DD + G; DD), and the role of students in the second phase of the discussions, with two levels (leaders and observers). The dependent variable was the quality of the syntheses, with two indicators: coverage of arguments and integration level.

The study comprised a total of seven 50-min sessions, one per week. The sessions were **AQ3** led by one of the researchers. Table 2 presents a synthesis of the sessions.

Session 1: Pre-test. The students were asked to elaborate an individual argumentative synthesis. The instructions for all participants were:

You are going to read two texts about a highly debated topic in science (pros and cons of transgenic foods/ nuclear energy). You should read the texts in the order in which they are presented. After that, you have to write an argumentative synthesis based on the texts you have read. Justify your conclusion with arguments, considering the information provided by both texts. You can read and consult the texts as many times you need, underline, take notes and make drafts.

Session 2: Instructions. The participants received specific instructions for each of the four programs. In DD + G + EI and DD + EI programs, this session was used to develop explicit instructions through video modelling. The students of both programs watched the videos where the volunteers simulated an expert discussion on the subject of alternative medicine, reaching an integrative solution. The video showed in the DD + G + EI program demonstrated how to hold a discussion with the support of a procedural guideline. By contrast, the students in the DD + EI program watched a video in which the volunteers developed a discussion without any external support. Both videos, which were approximately fifteen minutes long, were explained by one of the researchers, at the same time as they were being projected. The researcher paused the video after each stage of the explicit instruction procedure. At each pause, the researcher reflected with the students on what they had just seen, in order to promote the acquisition of the skills

illustrated in the videos. In the DD + G program, the instructions consisted of providing the students with the procedural guideline that they would use later during the discussions. During the 50-min session, the students were asked to read the procedural guideline carefully. To ensure that students were familiar with the tool, they were also asked to answer some reflective questions, e.g. *"Have you ever used a tool like this? If yes, for what kind of tasks?" "Have you been surprised by any section in the guide? Why?", "Is the language in the guide clear enough?".* The students in the DD program did not receive any instructions. They were asked to do the argumentation exercises described above. Despite the instructional differences, Session 2 was the same length across all programs.

Session 3: Practice 1A. In this session, discussion groups of 4–5 students were formed. Following the teacher's recommendations one of the members of the group was designated as the leader. Both the student groups, as well as the designated leader within the groups, were kept constant throughout all the discussion activities. The students received the following instructions to carry out the activity for Session 3.

The activity that you are going to do is a group activity, although you are going to start working individually. Each of the members of the group has to read the pair of texts that we have given to you. The texts are about the pros and cons of using of embryonic stem cells, which is a controversial topic nowadays. You must read the texts in the order in which they are presented. Later, you have to discuss the arguments of both texts with your group, in order to reach an argued and integrative conclusion on the subject. To reach this conclusion it is necessary to assess the reasons given by those who are in favour and those who are against, trying not to position yourselves on only one side of the problem. The conclusion has to refer to as many arguments from the texts as possible, and it must be written down. Within the group, there is a student who has been designated as leader and whose name appears on the sheet where you have to write the conclusion. This person has to ensure that the group completes the task in the 50-min session.

Finally, keep in mind that, in the next session, we will develop a new discussion in which only the leaders of the groups will participate. The leaders will have to communicate the conclusion reached in their groups, before starting their discussion.

The participants in the DD + G + EI and DD + G programs developed this discussion session with the support of the procedural guideline.

Session 4: Practice 1B. This session was a continuation of Session 3. It was the second phase of the discussion, in which only the group leaders participated. The other students in the class attended the session and observed the discussion. The task for the leaders in this discussion was to come up with an even more integrative solution, based on input from all the groups in Session 3. The students received the following instruction to carry out the activity for Session 4.

As we anticipated in the previous session, today's activity will consist of continuing the discussion on the subject matter of the texts that you have read. This second discussion aims to reach an even more complex conclusion about the controversy of the texts, if possible. The leaders of the groups will participate in this discussion, while the rest of the class will observe it, without intervening. Each leader will first have to give the argued conclusion that has been reached within their group and, when we know those for all the groups, the discussion will begin.

With the intention of keeping the attention of the rest of the students during the discussion developed by the leaders, they were given a sheet with the following question: *Do you agree with the conclusion reached by the leaders? If you think there is a better solution to the problem, write it down and explain why.*

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Sessions 5 and 6: Practice 2A, 2B. These were analogous to Sessions 3 and 4 respectively, but on a new controversial socio-scientific topic: The pros and cons of plastic materials, and was also presented through pairs of argumentative texts.

Session 7: Post-test. The participants wrote an individual synthesis, their final individual synthesis, and received the same instructions as in the first session. The students who elaborated the initial synthesis on the subject of transgenic foods wrote a final synthesis on the topic of nuclear energy, and vice versa.

Coding system

The quality of the students' argumentative syntheses was evaluated based on two criteria: integration level and coverage of arguments.

Integration level: we employed a ten-point scale (see Table 3), adapted from previous studies (Mateos et al., 2018). It represents the type and frequency of the argumentative strategies in the texts.

Coverage of arguments: we counted the total number of arguments included in the synthesis, based on a list constructed from the source texts.

Two independent judges evaluated the quality of the student syntheses, codifying 30% of the 372 syntheses. Reliability was very good (ICC was 0.94 for Integration Level and 0.98 for Coverage of Arguments). The cases in which there was no agreement were resolved by consensus, and the remaining 70% of the syntheses were evaluated by one of researchers using the established criteria.

Data analysis

The aim of the first analysis was to assess the effectiveness of the intervention, establishing any differences in student progress according to the type of instructional method. We compared pre- and post-syntheses written individually. The progress was evaluated according to our two indicators of argumentative synthesis quality, i.e. integration level and coverage of arguments.

The aim of the second analysis was to explore different learning paths for the two indicators of good argumentative synthesis texts—the integration level and coverage of arguments—regarding the instructional method employed in each program. We included two additional written products for this analysis. We added the quality of the texts the students wrote in groups after the two deliberative discussions, i.e. Session 3 and Session 5. The data for all time points: pre, post and two group discussion sessions, was analyzed using structural equation modelling (SEM). To explore the effect of the roles in the discussions, i.e. leaders *vs.* observers, we included the factor role in SEM analysis.

Pre- and post-synthesis analysis

Due to the pre-post design of our study, the students were measured repeatedly on the same variables. Multiple measurements per subject can generate correlated errors, which is a violation of the assumptions of standard (between-subjects) AN(C)OVA, and regression models. For this reason, we used linear mixed models (Quené & Van den Bergh, 2004, 2008) to assess the intervention effects. In addition to the variance components within and between students, the fixed effects were tested for the four conditions,

Table 3 Coding scale to assess the integration level of the argumentative syntheses

Level		Description	Example
0	Personal opinion	A personal opinion not based on the source texts	I think that transgenic foods are not good because they do not taste the same as normal ones
1	Neutral	A neutral conclusion	Transgenic foods are neither good nor bad. They have advantages and disadvantages
2	Argues in support	A conclusion in favour of one position	I agree with transgenic foods because they need less water to grow, they can have more vitamins than normal ones and they are resistant to insecticides. Spain should use more land to plant transgenic foods like soybeans
3	Integration via refutation	Takes a position in support one of the two perspectives and refuting the opposing perspective	In my opinion, transgenic foods are a great advance and people who disagree with them do not take into account the benefits for the population. These people say that transgenic foods are bad for health, but there is no evidence that anyone has gotten sick from eating them. In addition, all these foods pass many controls before being sold
4	Integration via weighting throughout the text. No final conclusion	Argues by weighting arguments from the two perspectives throughout the text, but does not include a final and personal conclusion on the subject	Transgenic foods have both advantages and disadvantages. It is true that they can be planted in land with less water and more saline, but it is also true that they can cause the disappearance of pollinating insects. They can be produced using fewer resources, although then very few companies sell the seeds
5	Integrative conclusion via weighting. No relation strategies of arguments and counterarguments throughout the core text	Argues by weighting arguments from the two perspectives in the final conclusion, taking finally a position in support one of the two perspectives. Absence of argument-counterarguments relations throughout the text	In my opinion, the risks of transgenic foods are much more important than the benefits that we can obtain from them. Although they are more resistant crops, they can cause genetic contamination. Preserving the original environment is more important to me than growing crops faster and for less money. For this reason, I would not allow transgenic foods to be planted

Table 3 (continued)

Level	Description	Example
6	Integrative conclusion via weighting. Relation strategies of arguments and counterarguments throughout the core text	Transgenic foods are a hotly debated topic and both those who are in favour and those who are against are partly right. Although it is true that they may have better nutritional properties, many times people do not know that they are eating transgenic foods because it is not always mandatory to label them. Furthermore, although they can grow with less water, transgenic foods can cause the disappearance of bees, which would be a disaster for everyone Taking all this into account, in my opinion it is not worth investing in transgenic foods. The drawbacks don't outweigh the benefits
7	Integrative conclusion via synthesizing (single solution). No relation strategies of arguments and counterarguments throughout the core text	After reading the texts, I think that one way to minimize the inconveniences of transgenic foods and to take advantage of their benefits would be to force countries not to dedicate more than 30% of the land to plant seeds of transgenic foods. With this restriction we would ensure that natural foods continue to be produced, since they are less dangerous for original plants and certain animals
8	Integrative conclusion via synthesizing (single solution). Relation strategies of arguments and counterarguments throughout the core text	Transgenic foods are a difficult issue. They are known for their benefits like being resistant to pests, having more nutrients or being cheap to produce. However, they also have significant drawbacks such as genetic contamination, or the monopoly of certain seed companies In my opinion, governments should support the production of transgenic food, but with restrictions. For example, transgenic foods should be planted in plots far from other types of crops

Table 3 (continued)

Level	Description	Example
9 Integrative conclusion via synthesizing (multiple solution). No relation strategies of arguments and counterarguments throughout the core text	Argues by synthesizing arguments from the two perspectives in the final conclusion, proposing multiple solutions to the controversy. Absence of argument-counterarguments relations throughout the text	*From my point of view, transgenic foods should be more widespread in Spain, although some precautions should be taken. If I was a consultant of the government, I would force genetically modified food companies to pay a tax that I would spend on raising bees. In addition, I would create a specialized organism in transgenic foods to study their properties and communicate them to the population*
10 Integrative conclusion via synthesizing (multiple solution). Relation strategies of arguments and counterarguments throughout the core text	Argues by synthesizing arguments from the two perspectives in the final conclusion, proposing multiple solutions to the controversy. Relates arguments and counterarguments throughout the text (at least two arguments from each side)	*Before reading the texts, I did not know what transgenic foods were. Now I know that they are products with multiple advantages, but also disadvantages. I find it very interesting that they are foods capable of growing in difficult conditions, such as areas with a lot of drought. In addition, they are foods with many vitamins and could help reduce hunger in the world. However, it is also true that they are a danger to the original plants and that human beings can develop allergies by consuming transgenic foods* *In my opinion, transgenic foods should be planted only in countries with desert areas, and a research team should be generated to analyse the side effects of transgenic foods before marketing them*

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measurement occasion and their interactions. These variables, and their interactions, were added one by one to the model. The fit of the model and the significance of the parameters can thus be evaluated in a likelihood-ratio test.

To test the effectiveness of each of the intervention programs we started with a baseline model (M1) including the intercept and variances within and between students. In a second model (M2) we added the fixed effect of time-measurement occasions. Thirdly, we included the effect of the experimental conditions (M3). Finally, we tested the interaction between the time and the experimental condition (M4).

The outcome variables were the two indicators of synthesis quality in these models i.e. the integration level and the coverage of arguments. The specified models were identical for both dependent variables.

SEM analysis

The four measurement occasions considered in this analysis were the pre-test (T1), the texts elaborated after the two deliberative discussions (T2 and T3), and the post-test (T4). We departed from the theoretical model shown in Fig. 1, with identical paths for both dependent variables.

Multi-group structural equation modelling was used to test for differences in learning paths due to the condition and role of the students. For each combination of condition and role the covariance matrix between the four measurement occasions was estimated. In successive models the relationships between measurement occasions were first constrained to be equal across groups (condition and role), and then in successive models allowed to vary according to the condition and role of the students.

For the sake of both integration and for coverage of arguments, we first considered a model that only allowed correlations between measurements occasions (M0). In the subsequent models, we made a distinction between the components of the model. In the second model we therefore added the effect of the sources- different topics in pre-test (M1). The third model tested an effect of the intervention condition on T2, T3 and post-test (T4) (M2). We then added the effect of the pre-test (T1) to the model (M3).

Two additional models related to the roles of the students were considered. In the fifth model the effect of role was estimated in order to answer the question of whether the relationships between T1, T2, T3 and the post-test depended on this variable (M4). In this analysis we added a constriction for the students who acted as observers: we did not consider differences between them. Finally, we tested whether the effect of role differed between conditions (M5).

Results

Effect of the intervention according to pre-post synthesis analysis

Table 4 presents the fit of the models, as well as a comparison of the models, for the dependent variables integration level and coverage of arguments.
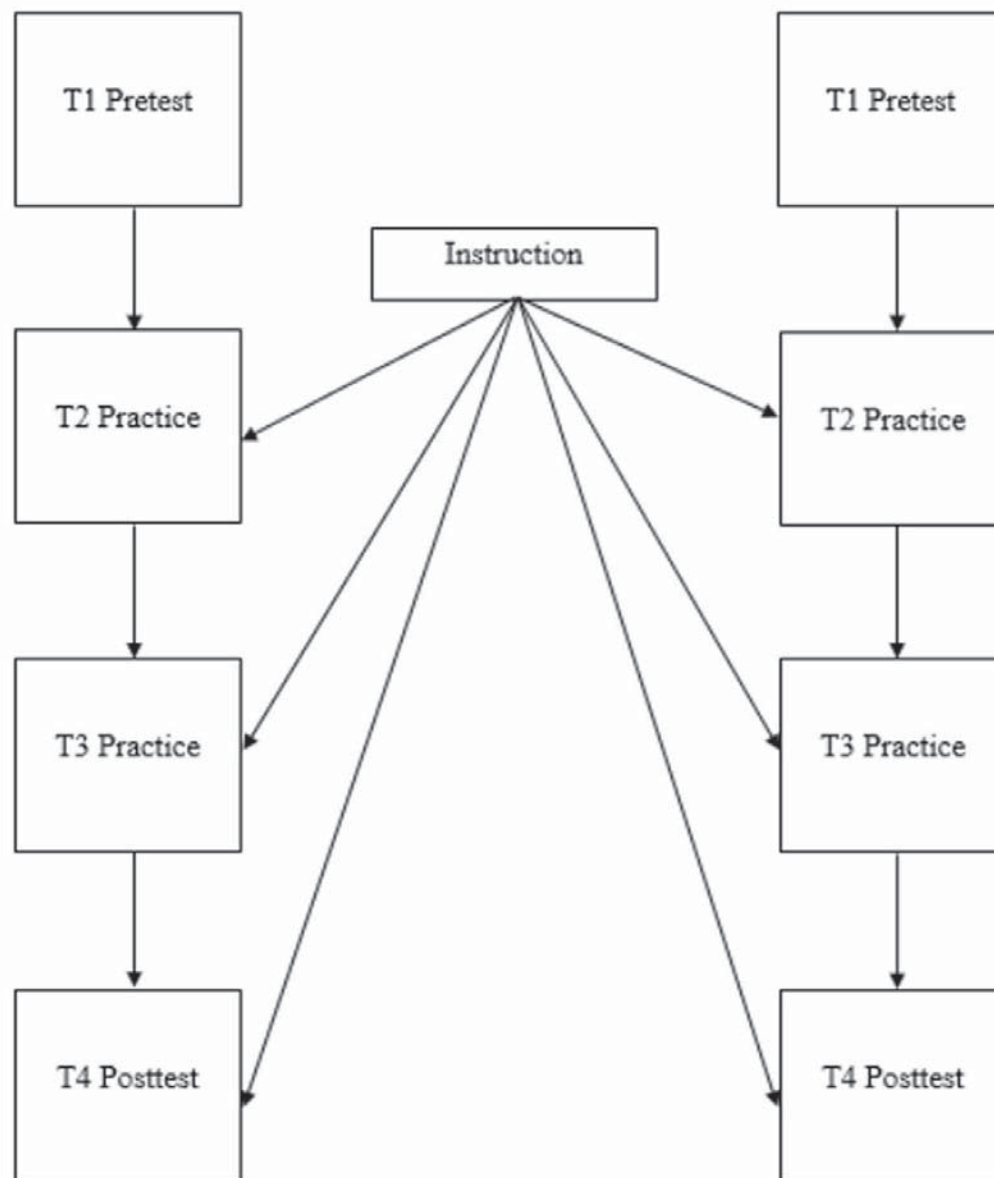
Fig. 1 Theoretical model for the effects of instruction and subsequent practice sessions (T2 and T3) on the two qualities of argumentative synthesis texts: the coverage of arguments, and the integration level (T4), providing pre-test scores (T1)

Integration level

Based on the comparison of the seven models for integration we conclude that measurement occasion (pre-test vs post-test) contributes significantly to the description of the data (χ^2 (1) = 104.98; $p < 0.01$). The same holds true for the main effect of condition (χ^2 (3) = 19.22; $p < 0.01$). The interaction between measurement occasion and condition did not reach significance, although a trend can be seen (χ^2 (3) = 6.55; $p = 0.09$). We therefore ran a model in which we included the variables whose effects were significant, i.e. measurement occasion and main effect of condition.

The estimated scores by condition and test occasion can be found in Table 5.

For the integration variable, the results showed that the students in the four experimental conditions improved the quality of their synthesis equally. Therefore, the instructional

Table 4 Fit of the models and comparisons for integration level and coverage of arguments

Model		− 2loglik	Comparison of models			
			Models	$\chi 2$	*df*	*p*
Integration level						
Model 1		1868.46				
Model 2	M1 + time	1763.48	1 vs 2	104.98	1	< 0.01
Model 3	M2 + condition	1744.26	2 vs 3	19.22	3	< 0.01
Model 4	M3 + time*condition	1737.71	3 vs 4	6.55	3	0.09
Coverage of arguments						
Model 1		1632.16				
Model 2	M1 + time	1602.86	1 vs 2	29.29	1	< 0.01
Model 3	M2 + condition	1592.02	2 vs 3	10.84	3	< 0.01
Model 4	M3 + time*condition	1578.89	3 vs 4	13.13	3	< 0.01

Table 5 Estimated means and standard error scores for integration level in each condition

Condition	Pre-test		Post-test	
	T1	*se*	Δ T4	*se*
DD + G + EI	3.35	0.31	2.6	0.26
DD + EI	5.03	0.32	2.6	0.26
DD + G	3.78	0.30	2.6	0.26
DD	3.52	0.30	2.6	0.26

methods that complemented the deliberative dialogue activities did not have a differential impact on this indicator. However, the trend observed when we explored the interaction between progress and the type of program is worth noting (see Table 4; χ^2 (3) = 6.55; p = 0.09). The estimated scores also show that combining the two instructional components, i.e. explicit instruction and procedural guideline, does not provide better results than presenting the aids separately.

Coverage of arguments

The variables that contribute to the description of the data for the coverage of arguments are: the measurement occasion (pre-test vs post-test) (χ^2 (1) = 29, 29; p < 0.01), the main effect of condition (χ^2 (3) = 10, 84; p < 0.01) and the interaction between measurement occasion and condition (χ^2 (3) = 13, 13; p < 0.01). We therefore ran a model in which we included these variables and their interactions, because their effects were significant. The estimated scores by condition and test occasion can be found in Table 6.

The results for the coverage of arguments variable showed a lack of equivalence between the experimental conditions at the beginning of the intervention. Before the implementation of the program, the students from the DD condition wrote synthesis texts that included more arguments from sources compared with the rest of the conditions. The students from all conditions improved the quality of their synthesis regarding the coverage of arguments, except for the students from the DD condition. Additionally, and as shown in

Table 6 Estimated means and standard errors scores for coverage of arguments in each condition

Condition	Pre-test		Post-test	
	T1	*se*	Δ T4	*se*
DD + G + EI	3.19	0.32	1.03	0.38
DD + EI	3.43	0.32	1.93	0.34
DD + G	4.01	0.30	1.56	0.37
DD	4.51	0.30	0.15	0.40

Fig. 2 Mean scores for the integration variable at the four measurement moments, regarding the instructional program
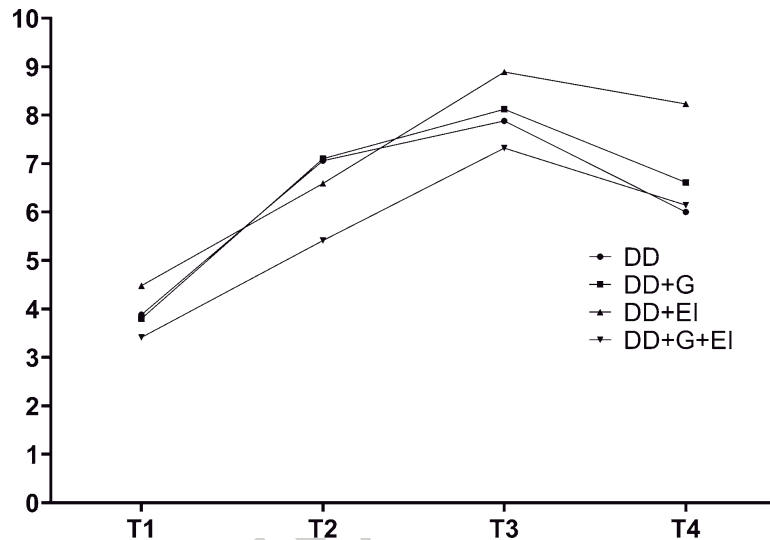
Table 6, if we compare their pre-test and post-test scores, the students from DD + G condition achieved higher scores on post-test, while those in the DD + EI condition achieved the greatest progress. This data suggests that dialogue activities are not a sufficient support for students writing syntheses with a large number of arguments. Secondly, the most effective instructional components to improve this aspect of the syntheses are explicit instruction through video modelling and the procedural guideline, whenever these elements were not presented in combination. The students of the DD + G + EI program did not perform well in the coverage of arguments.

Learning paths according to SEM analysis

The descriptive statistics of the four intervention conditions, on the four measurement occasions (the individual pretest-T1-, the two practice occasions-T2 and T3-, and the individual posttest-T4-), and for the two quality indicators of the argumentative syntheses, are graphically represented in Figs. 2 and 3. Table 7 presents the fit of the models, as well as a comparison of the models, for the dependent variables integration level and coverage of arguments.

Integration level

As shown in Table 7, only correlations within measurement occasions were allowed in the first model. The results showed that this model fits well with the data (χ^2 (170) = 140.26; $p = 0.95$). Adding an effect of the sources decreased the fit for integration ($\Delta\chi^2$ (6) = 0.28;

Fig. 3 Mean scores for the coverage of arguments variable at the four measurement moments, regarding the instructional program
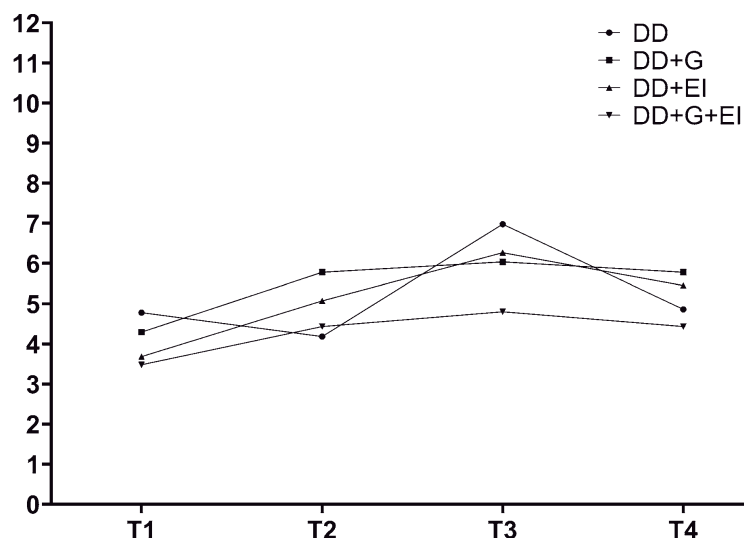
627 $p = 1.00$). The condition affected integration scores on T2, T3 and T4 ($\Delta\chi^2$ (9) = 41.29;
628 $p < 0.01$), but not on T1 ($\Delta\chi^2$ (3) = 4.13; $p = 0.25$). The role of students did not appear to
629 affect the scores for this dependent variable ($\Delta\chi^2$ (12) = 8.32; $p = 0.76$), and the effect of
630 role did not depend on the condition ($\Delta\chi2$ (12) = 8.08; $p = 0.78$).

631 We ran a final model (Model 6 (χ^2 (158) = 97.41; $p = 1.00$)) with the components that
632 contribute to the description of the data—the correlations within measurement occasions
633 (T1, T2, T3 and T4), and the effect of condition on T2, T3 and T4. Table 8 presents the
634 parameter estimates (β values) for the effect of practice in the four conditions, according to
635 the best model (M6). Table 9 shows the estimates of the instruction conditions on the suc-
636 cessive measurements. Figure 4 shows the learning paths obtained for each experimental
637 condition with respect to the integration variable.

638 As shown in Fig. 4, the learning paths for the DD condition and the DD + G condition
639 are exactly the same for the integration variable. By contrast, the learning paths for the
640 DD + EI and DD + G + EI conditions show different relationship patterns with each other
641 and with respect to the base condition (DD condition in which only deliberative dialogues
642 are included). The following results should be noted regarding the effects of the two prac-
643 tice sessions (T2 and T3) on the individual post-test (T4). We found a relationship between
644 T3 and T4 in only two of the four experimental conditions (DD + G + EI and DD + EI). In
645 the DD + G + EI condition, the relationship between T3 and T4 appears to be negative, i.e.
646 the students with high scores on T3 are likely to produce texts with low scores on T4. In the
647 DD + EI condition, however, the quality of text integration on T3 is positively related to the
648 quality of the texts on T4. In the DD + EI condition there is also a significant effect from
649 the integration quality of T2 on T4; the higher the quality on T2, the higher the quality on
650 T4 ($\beta = 0.32$; $se = 0.09$; $p < 0.001$). We did not find any relationship between the quality of
651 the products generated after the practice sessions (T2 and T3) in any of the instructional
652 conditions for the integration variable.

653 ## Coverage of arguments

654 As shown in Table 7, in M0 only correlations within measurement occasions were allowed.
655 The results showed that this model fits poorly with the data (χ^2 (170) = 176.78; $p = 0.34$).
656 Adding an effect of the sources did not improve the fit ($\Delta\chi^2$ (6) = 2.83; $p = 0.83$), however,
657 the condition affected the coverage scores on T2, T3 and T4 ($\Delta\chi^2$ (9) = 63.55; $p < 0.01$),

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Table 7 Fit of the models and comparisons for integration level and coverage of arguments

Model	Model fit indices						Model comparison			
	$\chi2$	Df	p	RMSEA	GFI	RMR	Models	$\Delta\chi2$	Δdf	p
Integration level										
Model 0 Only relations between measurement occasion	140.26	170	0.95	0.00	0.72	0.22				
Model 1 M0+effect of sources	139.98	164	0.91	0.00	0.72	0.22	0 vs 1	0.28	6	1.00
Model 2 M1+effect of condition on T2, T3 and posttest	98.69	155	1	0.00	0.78	0.19	1 vs 2	41.29	9	<0.01
Model 3 M2+effect of condition on T1	94.56	152	1	0.00	0.77	0.20	2 vs 3	4.13	3	0.25
Model 4 M3+effect of role	86.24	140	1	0.00	0.77	0.21	3 vs 4	8.32	12	0.76
Model 5 M4+effect of role depending on condition	78.16	128	1	0.00	0.78	0.20	4 vs 5	8.08	12	0.78
Model 6 Relations between measurement occasion+effect of condition on T2, T3 and posttest	97.41	158	1	0.00	0.79	0.18				
Coverage of arguments										
Model 0 Only relations between measurement occasion	176.78	170	0.34	0.04	0.81	0.18				
Model 1 M0+effect of sources	173.95	164	0.28	0.05	0.82	0.17	0 vs 1	2.83	6	0.83
Model 2 M1+effect of condition on T2, T3 and posttest	110.40	155	1	0.00	0.86	0.15	1 vs 2	63.55	9	<0.01
Model 3 M2+effect of condition on T1	90.81	152	1	0.00	0.90	0.11	2 vs 3	19.59	3	<0.01
Model 4 M3+effect of role	78.36	140	1	0.00	0.92	0.11	3 vs 4	12.45	12	0.41
Model 5 M4+effect of role depending on condition	74.73	128	1	0.00	0.91	0.11	4 vs 5	3.63	12	0.99
Model 6 Relations between measurement occasion+effect of condition on T1,T2, T3 and posttest	93.91	155	1	0.00	0.88	0.13				

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Table 8 Parameter estimates for the effect of practice in the four conditions, for integration variable

	Integration			
	DD	DD+G+EI	DD+EI	DD+G
T1 → T2	0.22	0.22	0.22	0.22
T2 → T3	ns	*b*	*b*	*b*
T3 → T4	ns	− 0.15	0.36	*b*

b: not different from DD condition

Table 9 Estimates of instruction condition on the successive measurements for integration variable

		Integration	
		Estimate	(*se*)
DD+G+EI	T2	− 0.07	(0.09)
	T3	− 0.22	(0.08)
	T4	0.09	(0.09)
DD+EI	T2	0.06	(0.09)
	T3	0.29	(0.08)
	T4	0.32	(0.09)
DD+G	T2	0.13	(0.09)
	T3	− 0.11	(0.08)
	T4	0.09	(0.09)

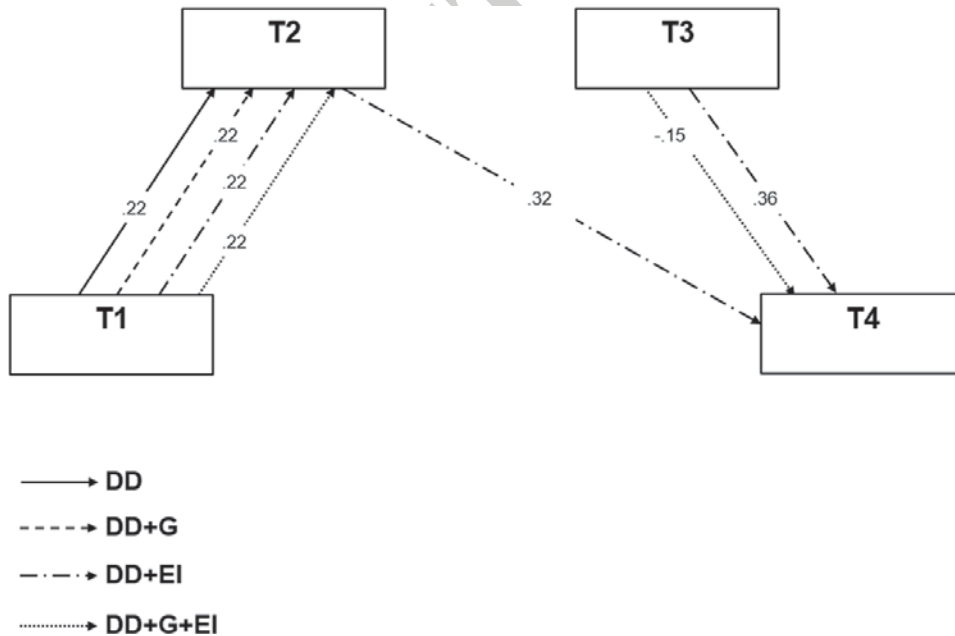The estimate is statistically significant if larger than 1.96**se (italized)

Fig. 4 Relationships between the measurement occasions for the four conditions, according to the best fitting model for the integration variable. Non-significant relationships have been omitted from the figure

Table 10 Parameter estimates for the effect of practice in the four conditions, for coverage of arguments

	Coverage of arguments			
	DD	DD+G+EI	DD+EI	DD+G
T1 → T2	ns	− 0.23	− 0.19	*B*
T2 → T3	0.37	*b*	*b*	0.74
T3 → T4	0.26	− 0.09	*b*	0.04

b: not different from DD condition

Table 11 Estimates of instruction condition on the successive measurements for coverage of arguments

		Coverage of arguments	
		Estimate	(*se*)
DD+G+EI	T1	− 0.31	(0.09)
	T2	− 0.02	(0.09)
	T3	− 0.35	(0.08)
	T4	0.10	(0.09)
DD+EI	T1	− 0.27	(0.09)
	T2	0.15	(0.09)
	T3	− 0.03	(0.08)
	T4	0.29	(0.08)
DD+G	T1	− 0.02	(0.09)
	T2	0.37	(0.08)
	T3	− 0.22	(0.08)
	T4	0.36	(0.08)

The estimate is statistically significant if larger than 1.96*se (italized)

and also on T1 ($\Delta\chi^2$ (3) = 19.53; $p < 0.01$). The role of the students did not affect the scores for the coverage of arguments ($\Delta\chi^2$ (12) = 12.45; $p = 0.41$), and the effect of the role did not depend on the condition ($\Delta\chi^2$ (12) = 3.63; $p = 0.99$).

We ran a final model (Model 6 (χ^2 (155) = 93.91; $p = 1.00$)) with the components that contributed to the description of the data, i.e. the correlations within measurement occasions (T1, T2, T3 and T4), and the effect of the condition on T1, T2, T3 and T4. Table 10 presents the parameter estimates (β values) for the effect of practice in the four conditions, according to the best model (M6). Table 11 shows the estimates of the instruction conditions on the successive measurements. Figure 5 shows the learning paths obtained for each experimental condition with respect to the coverage of arguments variable.

As shown in Fig. 5, the learning paths for the coverage of arguments vary depending on the experimental conditions. We did not find the same pattern of relationships in any of the four programs. The following results should be noted regarding the effects of the two practice sessions (T2 and T3) on the individual post-test (T4). In the DD condition T3 has a significant effect on T4; students with high scores on T3 are likely to produce texts with high scores on T4. The practice component on T2 also has an indirect effect on T4 in the DD condition, via T3 (T2 scores affect T3 scores, which in turn are related to T4 scores). Similar results are found in the DD+EI condition, in which there is also a positive relationship between T3 and T4, and an indirect effect of T2 on T4, via T3. There is no relationship between the second practice session and the post-test in the DD+G condition,
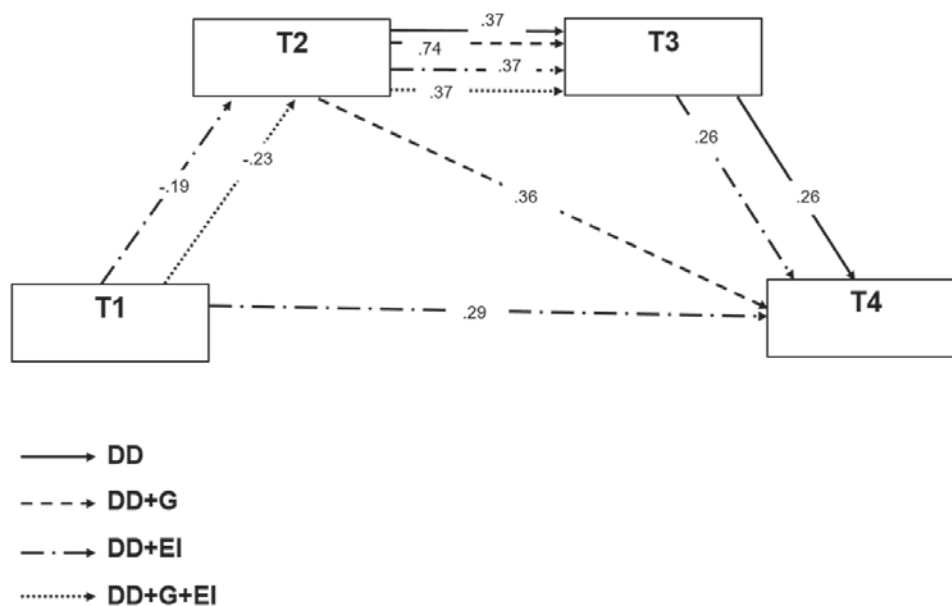
Fig. 5 Relationships between the measurement occasions on the four conditions, according to the best fitting model for coverage of arguments. Non-significant relationships have been omitted from the figure

but there is a relationship between T2 and T4; i.e. students with good texts on T2 are likely to elaborate good texts on T4 as well ($\beta = 0.36$; $se = 0.08$; $p < 0.001$). In the DD + G + EI condition the coverage of arguments on T2 and T3 is not related or does not affect the coverage on T4. For the coverage of arguments, unlike the findings for the integration variable, we found a clear relationship between T2 and T3; the higher the coverage score on T2, the higher the coverage score on T3. Furthermore, this relationship is especially strong in the DD + G condition.

Discussion

The objective of this study was to design, implement, and assess four intervention programs (DD + G + EI; DD + G; DD + EI; DD) aimed at improving argumentative synthesis writing in secondary school students. We analysed the effect of the different instructional practices that defined the four programs. Additionally, we explored the existence of different learning paths for our two indicators of synthesis quality, i.e. the integration level and the coverage of arguments, depending on the instructional method and the role of the students. We carried out a mixed model analysis and a SEM analysis to test the hypotheses of the study in relation to the objectives. The results of our study showed that the effectiveness of the instructional methods varies according to the synthesis quality indicator. Explicit instruction, in combination with deliberative dialogues, was especially helpful in improving the level of integration of syntheses. Whereas, the procedural guideline contributed more significantly to the coverage of the argument process. The combination of these two elements did not favour the writing of syntheses as expected, and was probably due to the conditions in which the intervention was carried out. The findings of this study are that the coverage of arguments and integration processes are of a different nature, they follow different learning paths and require different instructional processes.

The results partially corroborated the assumptions presented in our first hypothesis. According to the integration variable, the results of the mixed models confirmed the

704 positive effect of the intervention on the quality of the argumentative synthesis produced
705 by the students. All the participants achieved an improvement in the integration level of
706 their prior texts. This demonstrates that deliberative group dialogues are a suitable activity
707 to promote the writing of integrative argumentative synthesis. Several studies had already
708 shown the benefits of dialogic activities in argumentative writing processes (Crowell &
709 Kuhn, 2011, 2014; Kuhn et al., 2016; Litosseliti et al., 2005; Reznitskaya et al., 2001),
710 especially when these dialogues are raised with a deliberative rather than persuasive goal
711 (Felton et al., 2009, 2015b, 2019; Villarroel et al., 2016). However, there were no prec-
712 edents for intervention programs aimed at improving argumentative synthesis writing in
713 which this dialogic component had been introduced. This is one of the great contributions
714 of this study. Discussions are common classroom activities, but they are usually posed with
715 a persuasive goal. Our results show that when discussions are articulated with a delibera-
716 tive aim they can favour taking perspectives and the writing of syntheses in which integra-
717 tive solutions to controversies are sought.

718 Although we expected positive effects from the four programs on synthesis writ-
719 ing, we also hypothesised an interaction effect between the instructional method and stu-
720 dent progress. Our assumption was that the students from the most complete program
721 (DD+G+EI) would advance more significantly due to the combination of aids, i.e. the
722 explicit instruction and procedural guideline. However, contrary to our expectations, we
723 did not find any different progress depending on the condition. The mixed model analysis
724 showed a tendency related to the interaction effect, which supports the greater progress of
725 the students from the DD+EI program. Our initial assumption was also that the explicit
726 instruction would be a more effective instructional component than the procedural guide-
727 line in improving synthesis writing. Although the interaction effect did not reach signifi-
728 cance, the trend observed could suggest the benefits of explicit instruction through video
729 modelling, compared with the procedural guideline, to enhance the integration level of
730 the syntheses. The participants from DD+EI program were exposed to a video in which
731 several model students simulated an expert discussion to reach integrative solutions. The
732 researcher also explained and made evident during the video the processes of selecting
733 arguments from the sources, comparing them, the elaboration of an integrative conclusion,
734 and the writing of an argumentative synthesis that contains this conclusion and its justi-
735 fication. It is likely that this explicit instruction, by explaining and making the processes
736 underlying the task visible, promoted greater understanding and awareness of the task,
737 greater self-regulation and, finally, better performance in these students. To date, all the
738 programs aimed at improving argumentative synthesis writing had found explicit instruc-
739 tion, in combination with procedural guideline and collaborative practice, to be the most
740 effective instructional condition (Granado-Peinado et al., 2019; Mateos et al., 2018). How-
741 ever, none of these previous programs evaluated the effectiveness of explicit instruction as
742 an isolated component. Our study provides valuable information in this regard and corrob-
743 orates the potential of explicit instruction, which is a recognised element within many of
744 the interventions based on the self-regulated strategy development (SRSD) model (Graham
745 & Perin, 2007; Graham et al., 2013).

746 The mixed model analysis also showed the effect of the intervention on the second qual-
747 ity indicator: the coverage of arguments. In this case, we found a clear interaction between
748 progress and the type of instructional program. Firstly, and contrary to our expectations,
749 the intervention was not effective for all the participants regarding this quality indicator.
750 The students from DD program did not make any progress in the coverage of arguments.
751 The absence of any improvement in this group could suggest the need for an instructional
752 process that emphasises the phase of identification and selection of arguments, either

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through modelling, or through a tool such as the procedural guideline. The discussion sessions were more focused on reaching integrative solutions to the controversies, than on training the students in the coverage of argument processes. This would explain why those students who participated in the condition that only consisted of deliberative discussions did not experience improvement in this quality indicator of the synthesis. Additionally, the mixed model analysis showed that the students who made the most progress in synthesis writing, with respect to the coverage of arguments, were those from the DD + EI condition. Conversely, it was the students from the DD + G program who obtained the highest scores in the post-test. These results do not support our initial assumption about the greatest advance being that of students in the DD + G + EI condition, but they also partially confirm our hypothesis about the superiority of explicit instruction as an instructional component, compared with the procedural guideline. The fact that it was the students in the DD + EI program who made the most progress can be explained by referring to the content of the explicit instruction. Explicit instruction addressed all the procedural guideline sections, but through video modelling. The processes of identifying and selecting arguments from the sources were therefore explained in the thread of what was happening in the discussion between the experts, exemplified in the video. This feature of the explicit instruction may explain why students from the DD + EI condition, despite not having the procedural guideline during discussions, made such progress in the coverage of arguments. However, the data on the best performance in the post-test of the students of the DD + G program suggests that the procedural guideline was also a very useful element for improving the coverage of arguments. This result is not aligned with the findings of previous research, in which students from intervention programs with an explicit instruction component identified a higher proportion of arguments in their final texts, compared with those who only received the procedural guideline (Granado-Peinado et al., 2019; Mateos et al., 2018). Nevertheless, in this study the procedural guideline, in combination with the deliberative dialogues, contributed to the elaboration of syntheses with high scores in the coverage of arguments. There is evidence that graphic organisers contribute positively to argumentative writing processes (Nussbaum & Schraw, 2007). Our procedural guideline included a table in which the students wrote down and connected the arguments from the sources. This graphic support probably helped students to systematise and automate the process of selection and the identification of arguments.

As mentioned above, the results concerning both the level of integration and the coverage of the arguments did not confirm our initial hypothesis about the best performance of the DD + G + EI group. Following the evidence of Mateos et al. (2018) and Granado-Peinado et al. (2019), we expected to find a positive effect from combining explicit instructions with the procedural guideline, however our data did not support this hypothesis, but conversely, revealed a negative interaction between these instructional components. A possible explanation is that the procedural guideline was a distracting element during discussions when students had previously received an explicit instruction session. It is possible that students from the DD + G + EI program had difficulty handling several cognitively demanding tasks in a short session. During the deliberative discussions, students from this condition had to remember the video modelling of their prior instruction class, and make strategic use of the procedural guideline and reach integrative solutions to the controversy in a 50-min session. Perhaps including more practice sessions to automate the use of the procedural guideline, or extending the duration of the discussion sessions, could be important to test the joint effects of the aids. In future research, it would be worthwhile to analyse the development of the discussion activities in order to better understand why the combination of aids did not produce the results we expected.

802   The second objective of the study was to explore the learning paths for both indica-
803   tors of argumentative synthesis quality, depending on the instructional method and depend-
804   ing on the role of the students. SEM analysis enabled us to observe how the relation-
805   ships between the different texts produced throughout the intervention (T1, T2, T3 and
806   T4) change, according to the type of program and the dependent variables. However, the
807   SEM analysis did not reveal any significant effect of the role of students in their learning
808   paths. According to Mateos et al. (2020), we expected two different learning paths for the
809   integration level and the coverage of arguments. Our results confirmed this hypothesis and
810   also provided information about how the relationships between the different measurement
811   points vary, depending on the instructional condition. The differences found in the learning
812   paths, in relation to the dependent variables and the instructional programs, are grouped
813   around two aspects: (1) the relationships between the intermediate products (T2 and T3),
814   and (2) the effect of these intermediate products in the post-test (T4).

815   Regarding the relationships between T2 and T3, it should be noted that we did not
816   find any effect of T2 on T3 in any intervention condition for the integration variable. The
817   relationship between these intermediate products did not reach significance. This result is
818   consistent with the findings of Mateos et al. (2020), who also did not find a relationship
819   between the texts generated during the two collaborative practice tasks, in the instructional
820   condition and for the integration variable. In our research, this result could be due to the
821   theme of the texts on which the discussions were based. It is possible that the texts caused
822   different degrees of dispute between the students. According Taber and Lodge (2012),
823   when individuals read controversial texts about subjects on which they hold strong beliefs,
824   they dedicate more effort to processing disconfirming evidence. It is possible that some
825   of our texts had an important emotional load that hindered the integration processes car-
826   ried out by the students. This variable could have caused the absence of any relationship
827   between intermediate product scores. Conversely, we found a strong relationship between
828   T2 and T3 in all the intervention conditions for the coverage of arguments, especially in the
829   DD + G program. The students who selected a large number of arguments in the conclusion
830   given after the first discussion also selected a large number in the text produced after the
831   second discussion. Our results are again aligned with those of Mateos et al. (2020), who
832   observed that practice sessions were related and lead to an indirect effect of instruction
833   on the post-test scores, through collaborative practice. These findings reveal that the use
834   of the procedural guideline during discussions is helpful for the coverage of arguments
835   because the graphic organiser makes the identification and the selection task very clear.
836   Some research supports this assumption and confirms the potential of similar aids such as
837   argument maps (Rapanta & Walton, 2016; Scheuer et al., 2014), which are useful scaffolds
838   for critical thinking and writing.

839   Relationships between the intermediate products, T2 and T3, and the post-test, T4, also
840   differed between the conditions, and with respect to the synthesis quality indicator. In the
841   DD + EI condition, we found a strong positive relationship between the integration level of
842   the intermediate products and the level of integration on post-test. Both T2 and T3 enabled
843   scores to be predicted on T4. In the DD + G + EI condition we observed a negative relation-
844   ship between T3 and T4, which means that the students with low scores in T3 are likely to
845   produce texts with high scores in T4. This suggests that the combination of explicit instruc-
846   tion and procedural guideline may contribute positively to the final syntheses elaborated
847   by the students with lower results in the group activities. Therefore, only the students who
848   received explicit instruction (DD + G + EI and DD + EI program) were able to transfer the
849   learning related to the integration processes from these group activities to the final individ-
850   ual writing task. This result is aligned with the findings of the study by Granado-Peinado

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et al. (2019), in which the authors showed how students successfully transferred the skills developed to their own individual writing tasks after the intervention encouraging collaborative work.

We found a positive relationship between T3 and T4 in the DD condition regarding the coverage of arguments. The scores on T3 enabled the scores on T4 to be predicted. Due to the existing relationship between T2 and T3, we could also identify an indirect effect of T2 on T4, mediated by scores in T3. Something similar also happens in the DD+EI condition. A positive relationship between T3 and T4 and an indirect effect of T2 on T4, mediated by the scores on T3 also emerged in the DD+EI program. The students from the DD and the DD+EI conditions were thus able to transfer their learning related to coverage processes from these group activities to the final individual writing task. Something striking happened in the DD+G condition, where we found a strong relationship between the intermediate products and between T2 and T4, but a non-significant relationship between T3 and T4. We can conclude that students from the DD+G condition had been able to transfer what they learned to the final synthesis as a consequence of the instruction session and the use of the procedural guideline only during the first discussion. It would be necessary to explore what happened in this second discussion session to understand why the relationship between T3 and T4 became non-significant in the DD+G condition.

In summary, the results from both types of analysis, i.e. the mixed models and the SEM, suggest that instructional methods have a differential impact depending on the quality indicator of the synthesis writing: the integration versus the coverage of arguments. Although the mixed model analysis showed the same progress in all four conditions, taking into account the integration level of the synthesis, the SEM analysis enabled us to nuance these results. The learning paths in the DD+G program and the DD program were identical for this variable. The procedural guideline component did not enable the learning results related to the integration variable to be predicted in any case. Conversely, explicit instruction, especially when it was not combined with the procedural guideline, as indicated by the tendency observed in the mixed models analysis, was related to the level of integration of the syntheses produced by the students at different points of the intervention. Regarding the coverage of arguments, the mixed models already indicated a differential advance depending on the method of instruction, and the SEM analysis confirmed the existence of different learning paths for each program. The procedural guideline and the explicit instructions were useful for improving the identification and the selection of arguments, although these instructional components offered better results when they were not combined in the same instructional program.

Therefore, our findings reveal how different instructional methods can contribute to different aspects of argumentation. Several empirical studies have also shown the different impact of an intervention, depending on the component of the argumentation considered. For example, von der Mühlen et al. (2018) conducted a study aimed at training students in argumentation comprehension. Their training intervention was designed to increase the students' familiarity with the basic structure of informal arguments and to improve their ability to recognize the different components and their relations using the Toulmin (1958) model. The authors found that the intervention was not equally useful in recognizing the different components of the arguments. Specifically, the training was particularly helpful in identifying more complex arguments with a less typical structure and the relational aspects between key components, i.e. warrants. On the other hand, our results related to the differential impact of the instructional methods on the variables of integration and the coverage of arguments can be explained according to the model proposed by Hefter et al. (2014). These authors adapted Kuhn's (1991, 2005) argumentation model, proposing three

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components of argumentation skills: evaluative knowledge, generative knowledge and argument quality. Evaluative knowledge is related to the ability to recognize evidence and pseudoevidence, generative knowledge is focused on generating argumentative elements such as counterarguments or rebuttals, and argument quality is presented as a global component that refers to the application of the whole argumentation model when generating one's own position. According to Hefter et al. (2014), high argument quality requires elaborating an own position built of theory, genuine evidence, alternative theory, counterargument, rebuttal and synthesis. Evaluative knowledge and generative knowledge refer to the different steps of the argumentation process. For these authors, it is not essential to know how to elaborate argumentative elements such as counterarguments when identifying arguments and their strength based on the evidence and pseudo-evidence. However, high quality argumentation requires both processes. In the same way, writing a quality argumentative synthesis implies not only the identification of the arguments, but also the integration of the arguments and counterarguments of the opposing positions. The integration process seems to be more cognitively demanding than the coverage of argument process. The integration process, i.e. integrative reasoning, requires the students' formation of cross-textual connections during reading and the specific cross-textual connections that result (List et al., 2020). List and Alexander (2019) argued that students might demonstrate four levels of integration, or integrative reasoning, when forming connections across texts, i.e. level 1, relational identification; level 2, separate representation; level 3, simultaneous relation; level 4, relational elaboration. Only in the last level are students able to fully and holistically understand multiple texts (List et al., 2020). Therefore, the complexity of integrative reasoning could explain the need to explicitly teach how to integrate information from sources when elaborating an argumentative synthesis.

Although we may have shed some light on the black box of the learning process of synthesis writing through the combination of two types of data analysis, we are still missing information. A limitation of our study is that group discussions were not registered. It is important to record the actions and verbalisations of the students during the deliberative discussion to confirm some of our assumptions, such as those related to the procedural guideline as a distracting factor during discussion sessions in the DD + G + EI condition, or the assumptions linked to a possible imbalance in the controversy generated by the texts dedicated to the discussion sessions. Another limitation of our study is the fact that the students assigned to the role of leader were chosen by the teachers. Although a suitable experimental design would require a randomisation of the subjects to the different roles, on this occasion and for this variable, we preferred to prioritise ecological validity. The researchers did not have enough knowledge about the participants, and it was necessary that the discussions were stimulated by the participatory students. On the other hand, all the instructional conditions included the component of deliberative dialogues, since we aimed to test whether these dialogic group activities, in combination with different instructional methods, favoured the writing of argumentative syntheses. In future research it would be interesting to include an extra condition, i.e. a control group, in which these activities are not proposed. Furthermore, with regard to the experimental design, it should be noted that we did not carry out a random allocation of the subjects to the instructional conditions, but assigned intact class-groups. This is common when research takes place in real settings such as a school, although it reduces control over some of the variables that can affect the results. In this study we tried to guarantee the equivalence of the intervention groups by considering the scores of the participants in the Spanish language. Future research should collect other variables from the students to control their effects or at best, make a completely random allocation of students to the experimental conditions. On the other hand,

T2 and T3 scores were group scores, while T1 and T4 scores were individual scores. In the learning path SEM models, each student received the group score for T2 and T3; a fact that can create dependencies between the data. In future studies it would be necessary to have intermediate measures also of an individual nature to be able to monitor each student throughout their learning process. Finally, it should also be noted that in this research we used source texts in which two opposing views on a topic were presented. In future studies, it would be interesting to raise more than two perspectives on the controversies on which deliberative discussions and argumentative synthesis tasks are based.

Despite these limitations, this research has several educational implications. Most interventions aimed at improving synthesis writing are designed as instructional packages, in which different elements such as explicit instruction or graphic organisers are combined. This study has the potential to evaluate the effectiveness of instructional components, both in combination and separately. Our findings also make it clear that instructional programs should be aligned with the learning outcomes they are intended to promote. The pre-post analysis in combination with the SEM analysis allowed us to explore in a holistic way, how argumentative synthesis writing is learned, as a result of the instructional programs provided. The results from the mixed model analysis suggest that the deliberative discussions contribute to the integration of opposite positions, allowing the students to address both sides of an issue when they write argumentative synthesis. This evidence is consistent with previous research in which deliberative dialogues, compared with persuasive dialogues, favoured the integration of arguments and counterarguments (Felton et al., 2009, 2015b). However, the results from the path analysis reveal that only the students who received explicit instruction, before their participation in the deliberative discussions, were able to transfer the learning related to the integration processes from these group activities, to the final individual writing task. According to this evidence, teachers and course designers should be aware that these types of dialogic activities might not be enough to enhance the processes involved in the writing of integrative argumentative synthesis. Conversely, identifying arguments is easier than integrating them and therefore, an instructional aid based on a procedural guideline, in combination with deliberative dialogue activities, may be sufficient to acquire the processes related to the coverage of arguments. Finally, this study has highlighted the importance of paying attention to contextual factors when applying intervention programs. The combination of instructional aids may not be the best teaching method if they involve high cognitive processing and if they are subject to time limitations.

Appendix 1: Explicit Instructions (script)-DD + G + EI condition[1]

Good morning everyone. Within the activities of our argumentation project, today we are going to teach you to integrate different positions when discussing a controversial issue.

Debates are discussion activities that you are probably familiar with. It is common for some subjects to organise activities of this type for you to express your opinion on a controversial issue. In many cases there is no type of prior organisation and you can intervene one by one to give your opinion on the matter. However, debate activities in which teams are formed within the classroom to simulate a debate such as those on television are also

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[1] This instruction corresponds to the DD + G + EI program. The instruction in the DD + EI program followed the same structure, but without including allusions to the procedural guideline.

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common. Imagine that in the subject of ethics you see a film in which a person is sentenced to life imprisonment. After watching this film, your teacher could suggest a debate in which half of the class argues in favour of this type of punishment and the other half, against. This assignment of positions could correspond to your previous opinion on the subject, or not.

When organising the discussion in this way, that is, with "opposing" sides, it tends to generate the idea that there is only one correct position on the controversy. This then involves putting in place a series of argumentative strategies that seek to persuade the opposing team to change their mind. In these cases, it usually happens that the assigned position is defended from the beginning, arguing in favour of it, citing reasons and evidence that supports it, and ignoring what the other position has to say. On other occasions, in addition to defending the chosen position with arguments, it is decided to enumerate the arguments of the opposite position, without considering, evaluating or reflecting on them. In the best of cases, persuasion is sought through the rebuttal strategy. This strategy consists of defending our position firmly with arguments and discrediting the opposite opinion, explaining why it is false or not properly supported.

These strategies are not the wrong approach if the goal of the discussion is to persuade, however, they carry the belief that there is only one valid position on the topic of discussion, when, in truth, most controversial or controversial topics tend to have both advantageous and problematic aspects.

Bearing in mind the latter, discussions on controversial issues can be raised from another approach, which encourages an in-depth exploration of the different positions and the search for a solution that includes the best aspects of each position. This approach is more conducive to learning and helps us "put ourselves in the mind of the other".

Have you ever been super convinced of something, and after listening to someone's arguments you realise that that person also says interesting things that you had not thought about? Well, in those cases it is important not to remain "anchored" in our positions, and try to reconsider our previous opinion in order to elaborate a more complex conclusion. Today we are going to learn how to do this in a discussion about a controversial topic, about which there may be conflicting opinions.

This class can also help you with the task of creating argumentative syntheses, since the processes that we are going to explain, and that are set in motion during a discussion that aims to reach an integrative conclusion, are the same as those which have to be followed to produce a written synthesis. The writing of an argumentative synthesis, if you remember, was the task that you had to do in the first session of the project. In the last session, you will do another one.

That said, I am going to tell you how we are going to work throughout this class. I am going to show you a video in which four students appear doing the discussion activity that you yourself will have to do the next day.

These students have been assigned the task of reading two texts on a controversial topic and generating a group discussion to reach an argued conclusion on the topic. To assist you in this discussion, you have been provided with a procedural guideline that details the sequence of steps you can take in the process. The group conclusion reached by these students must be communicated by the leader of the group in an upcoming discussion session, in which only the leaders will participate. The topic they read and discuss in the video is related to the area of science, as were the texts that you used to make the argumentative synthesis in the first session. The students in the video must read and discuss the benefits and drawbacks of natural therapies, such as acupuncture or homeopathic.

This video is made up of different scenes, each of which is intended to illustrate a different phase or step. These phases or steps must be followed when developing a

discussion with a goal of integrating positions, and when said discussion has to lead to the elaboration of a final written conclusion. The phases or steps illustrated in the video coincide with the sections in the procedural guideline.

As I have explained, these steps are illustrated in the different scenes of the video and, in turn, correspond to the sections of the procedural guideline that were given to the students. One important thing is that although the phases are presented in a certain order in the video and in the procedural guideline, they do not have to be linear. This means that when you develop the discussion yourself the next day, you will be able to re-explore the different positions when you are contrasting them, or, when reviewing the text, some of the members of the group will be able to return to the conclusion to rework it, etcetera.

So that the video can help you as much as possible, after each scene I will make a brief intervention in which I will explain what we have just seen, and at the same time that I will show you the section of the procedural guideline that corresponds to the process or step illustrated in the video.

Okay, well, having said that, let's start watching the video.

Video

Scene 1 is projected. Reading the procedural guideline

Explanation of the scene

Well, as seen in this first scene, the students begin the task after having read the instructions. You see that in the video there is a student who has been chosen as leader. The role of this student within the group is quite important. The main thing that this person has to do is make sure that, at the end of the discussion, an argued group conclusion has been generated that can be carried over to the next day, in the discussion session between leaders. This does not mean that all the burden of the discussion should fall on this person. Quite the opposite. As it is a group discussion activity, all students have to participate and contribute their opinions. What the leader has to do is ensure that the discussion is orderly, and to try to make progress in the different steps or phases of the process to elaborate the argued conclusion. Timing is essential, as at the end of the session you need to have a detailed and written group conclusion.

As you can see in the video, before starting to read the texts individually, the students take a look at the procedural guideline to get a general idea of what they will have to do throughout the activity.

The procedural guideline highlights some strategies for working collaboratively that are important for us to keep in mind. (*List them*).

Bearing in mind what they are going to have to do, the students have already read the texts individually, and, as you can see, they make annotations as they read them. It is good to highlight the information that we consider important and useful for discussion in the texts. Different strategies can be followed, such as underlining, making annotations in the margins, writing down the ideas on a separate sheet of paper … The important thing in this phase is trying to understand what the texts are about and assimilating the information they present in order to be able to discuss it later.

Although the students in the video first read the texts individually and then generate the discussion, when you do the task you can comment during the reading or after it. There is no single way to carry out this initial reading phase.

Time limitations mean we have not collected this episode in its entirety in the video, but you can intuit the process that the students have followed, reading individually, pointing out the arguments in the text, noting comments and observations in the margin, commenting on their impressions with their classmates … In short, you should use all the resources that you think are appropriate to make a good initial reading.

Let's see what the next step is.

Scene 2 is projected. End of reading and beginning of discussion

Explanation of the scene

As you have seen, when the students finish reading the texts, the leader begins the discussion by referring to a series of questions that appear in the procedural guideline. The questions are as follows: (the slide in the procedural guideline is projected, containing the table and the questions on the topic of discussion, etc.).

Based on these questions, the students comment on what they think the theme of the texts is and explore the opinions of the group about it, as well as whether these changed after reading.

It is very important that you ask each other questions that stimulate discussion, both those that you can find in the procedural guideline and others that help you work together, and that help you to analyse the texts and communicate the ideas you may have on the subject. Asking and answering questions will help you get a broader view of the texts by sharing your perspectives on them, and generating and sharing ideas. In this sense, the leader will have the responsibility of supervising and ensuring that the necessary questions are being asked to understand and elucidate the texts.

Similarly, the leader must also guarantee that there is no stagnation of the discussion in anecdotal information, which, may even not be directly related to the subject matter of the texts. If you noticed, there is a moment in the scene when the leader points out that the discussion is focusing too much on cancer. This type of signalling is important so that time is not wasted without having completed the task.

Scene 3 is projected. Identification of arguments and generation of the table

Explanation of the scene

As you can see, in this phase the students state the arguments that they have been identifying in the texts and cooperatively construct a table with two columns. This graphic tool helps to easily compare the information from both sources and to establish possible relationships between arguments.

Before moving on to the next phase, it is necessary to clarify that, although we saw in the scene that the students analyse the arguments of the first text and do not go on to explore Text 2 until they finish with it, this is not the only way to do that. Another possibility would be to identify the arguments of both texts at the same time.

Scene 4 is projected. List of arguments and assessment of their importance

Explanation of the scene

This scene illustrates how the students realise, thanks to the table they have just made, that some arguments in the text about the benefits of natural therapies respond to some arguments in the text about the disadvantages. This means that the students have found relationships between arguments and that it seemed important not only to mention them, but also to point them out through some mechanism. To do this, they chose the strategy of connecting the arguments that may be related to each other with arrows.

The identification of these relationships can be of great help for the elaboration of an integrating conclusion that tries to reconcile two positions which are, a priori, opposed.

Just as I could help in this search for possible relationships, it can also be useful to assess the importance of each argument. When one reads, and not only identifies the arguments, but also values and contrasts them with others, the weight of each argument may vary. This is something that is reflected in the video when one of the students makes it explicit that for him there is an argument in the text about the disadvantages of the therapies that practically nullifies any advantage they have. This assessment of the importance of the arguments is important when preparing the argued conclusion, since it can revolve around those who have the most weight.

In summary, we have seen in this phase of argument exploration how the students share what they have previously done individually. This comparison or contrast between the arguments and counterarguments that they have individually identified will enrich their understanding of the texts and the subsequent argumentation, because as we have seen, by sharing what they had done individually they exchange ideas or reasoning that they had not reached on their own. In this process of comparison, the students are connecting the arguments of both positions. This is a process that involves relating the arguments of the positions to each other and assessing their importance. They can be related because the arguments complement each other, because they are opposed and what is said in one text allows us to refute what is said in another … but we can also consider the importance and weight they have, since the latter will allow us to elaborate and structure the conclusion. The questions that appear in the procedural guideline support these two processes and the graphic resources are also a clear aid.

Scene 5 is projected. Drawing conclusions

Explanation of the scene

This is a key phase of the process, since it is necessary to find a solution that is satisfactory for all members of the group, and that at the same time integrates aspects of the two positions. In other words, everything that the students in the video have done so far must be summed up in one conclusion. This conclusion must be the result of the relationships and the assessment of the importance of the arguments that have been identified.

As we have seen in the video, the students are not writing a text as such. They simply continue the discussion to reach an integrative conclusion, considering what has been mentioned in the previous contrast phase. Now, to facilitate the later writing task, they

do point out a series of things. If you remember, one of the students proposes taking notes schematically.

In order to help reach this inclusive conclusion, the procedural guideline poses some questions that point out the fundamental aspects of this phase.

Remember that it is about integrating both positions. Stating the arguments of both positions and saying that both are right is not an integration. Nor is it an integration, as we pointed out when we talked about persuasive strategies during debates, to opt for one position and argue only that, or refer to the other only to refute it.

Here we are teaching you to integrate both positions; that is, to try to find the links between the two positions, and even to draw up novel and alternative conclusions that respond to the difficulties encountered in each of them. There is no completely true or wrong opinion, and that is why we need to integrate the different positions in the final conclusion.

In the video you have been able to see one of the ways to arrive at an integrative solution: the students agree on what their position will be—to be in agreement with natural therapies—and under what conditions they will defend it, as long as they comply with a series of guarantees and medical controls, reaching a conclusion that integrates aspects of both positions.

The students could have used a consistent strategy of weighing the arguments of both positions. They could have valued arguments and counterarguments, explaining why the advantages of a position outweigh its disadvantages. In this way, what we are doing is prioritising positions, but we are not dedicated to showing that one of them is false. What we do is recognise the value of both. For example, students might begin by explaining the first argument of a position and how the opposing text refutes or counters it. In this sense, they could talk about whether natural therapies are adequate or not, assessing the support provided by both texts (*the first text believes that these therapies are appropriate because they have a global approach to the person and do not focus only on symptoms … and the second text argues that they are not adequate, since they do not pass a series of controls and their long-term consequences are unknown…*). In this way, they could recognise the importance of both positions, to finally opt for the most advantageous position (*however, although it is true that these therapies can be beneficial because* a priori *they concern themselves with more general aspects of health, it is necessary to guarantee that its application does not have side effects, since they are treatments that have not passed a series of controls like the drugs we ingest do…*).

A final option or strategy that we can use to build our conclusion is to come up with a completely new solution that overcomes the problems posed by the two positions and combines the advantages of both. When you develop the discussion, you will have to use these different integration strategies, which are not mutually exclusive.

A final important issue that is highlighted in the video and in the procedural guideline is the number of arguments for both positions mentioned in the conclusion. It is important that the conclusion responds to all the problems raised by both positions. This means that when an integrative solution is proposed, it has to collect all the comparisons of arguments made and the conclusion that we derive from that comparison.

Scene 6 is projected. Textualisation

The next step, as you have seen in the video, is to put in writing the conclusion that the students have reached. It is possible that the next day, when you are in this phase, you will

1208 already have part or all of the text in writing. There is no one way to do homework. As we
1209 have mentioned, in the procedural guideline and in the video, everything appears in a very
1210 linear way, but in fact, it does not have to be that way.

1211 Perhaps when you write, you realise that you are not so sure about what you originally
1212 agreed. This is normal, because when we write, our ideas can change. Writing helps us
1213 learn, and is a decision-making process that affects the content and form of texts.

1214 The questions in the procedural guideline are intended to help us make these decisions:

1215 In what order are we going to present the argument? First arguments and then counter-
1216 arguments or do we insert them?).

1217 In the video, the students had to make decisions about the order or structure to follow
1218 before writing, or how to write the ideas. To do this, they have been expressing their opin-
1219 ion of what they think is the best way to write the conclusion they have reached. They have
1220 explained how they usually approach this task when they do it individually and have agreed
1221 on what the main message of the conclusion had to be and on how to structure the text.

1222 This situation of agreement does not have to occur in all cases. The good thing about
1223 working in a group in this phase is that it facilitates the way that, when writing, we have to
1224 make explicit the ideas that we want to capture in the text to see if they are shared within
1225 the group. Based on the information that we put "on the table", we can detect incongruities
1226 that must be resolved between all of us. The message that we want to convey in the text is
1227 thus collectively elaborated.

1228 Scene 7 is projected. Revision

1229 As can be seen in the video, the students make a final review of the written product they
1230 have generated. In this way, they make sure that they have integrated everything that they
1231 had agreed to include in the text, and, in addition, they check that they agree with the mes-
1232 sage in the conclusion. This is important, because in the next session the leader will convey
1233 the opinion of the group and it is necessary that it be shared and understandable.

1234 When we talk about proofreading, we often dwell too much on questions of grammar
1235 or syntax. This is important because the text has to be legible, however, we must not forget
1236 that the group's position is clear, or that the conclusion includes the agreed arguments and
1237 that these have been duly supported.

1238 The procedural guideline contains a series of questions that can help with this final
1239 review (Is your position clear? Are all the arguments there? Are they convincing? etc.).

1240 **Appendix 2: procedural guideline**

1241 **Steps of the process collected in the procedural guideline**

> - Identification and exploration of the different positions on the controversial issue.
> - Comparison of positions.
> - Elaboration of conclusions.
> - Writing a text that collects the conclusions reached.
> - Text revision

Tips for developing a group discussion

> ➢ <u>There is no right way to do homework</u>, so there are no good or bad ideas or opinions
> ➢ <u>Listen actively</u> to what your classmates have to say. If at any time you do not agree with something, communicate your opinion.
> ➢ **If you believe that the ideas of your colleagues can better solve the problem you are encountering, do not impose your opinion. It is important to change the way you look at the issue and accept other proposals.**

Before starting the task, who will be the leader of the group?

This student will have to ensure that the steps proposed in this procedural guideline are being carried out, promote the discussion and guarantee that an argued conclusion about the controversy is reached.

You can read the complete procedural guideline before starting to read the texts so as to have a general outline of the steps to follow.

1242

1243 Positions on the topic

1244   You will find a table and some questions that could help you identify and organise

1245 the different positions in the debate and the arguments used by each of them.

1246   –   What is the subject of the debate?

1247   –   What previous opinion did you have about debate? Has this changed?

1248   –   What are the different points of view on this issue?

Position in favour Arguments (what reasons justify this position?)	**Position against** Arguments (what reasons justify this position?)

1249

Comparison of positions

1251 Below, you will find some guidelines and questions that will help you compare the differ-
1252 ent positions.

> Do the arguments of one position counter those of the other? How could those who defend Position 1 counter those who defend Position 2? And backwards?
>
> You can mark the relationships between arguments and counterarguments with arrows in the table above

> Do all the arguments have the same importance?

1253

Conclusion of the controversy

1255 Here are some questions that could help you draw a conclusion about the controversy:

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- Is there a position that has more weight? Why?
- Is there a way to reconcile the two positions? Why? Is there a new alternative that integrates the different positions?
- Is there a position where its strength depends on certain conditions being met?
- Have you thought of a conclusion that compares various arguments from both positions? Does this conclusion answer several of the problems raised by the different positions?

Have you come to any conclusions after reflecting on these questions? Have you reached any conclusions after reflecting on these questions?

Writing the text

Here are some questions that could help you organise your ideas:

- In what order are you going to present the argument? In the previous order, first the arguments and then the counterarguments, jumping from one to the other, inserting them …?
- Is it better to start with the strongest argument or to leave it until the end?
- Do we need to repeat our point of view at the end?

Have you answered these questions to organise your ideas?

Review of the text

Finally, you will find some questions that could help you to review and self-evaluate your text during writing and when you have finished it:

- Is our position clear?
- Do all the arguments that we have thought justify our conclusion?
- Are they convincing, and are they justified with good reasons?
- Are all the ideas well linked? Is it clear how all the sentences in the text relate to each other?
- When you have reviewed any part of the text, has it been ambiguous?
- Is there any spelling, syntactic errors, etc.?

Have you used these questions to review and self-evaluate your text?

Appendix 3: Read the following text by Elvira Lindo and answer the questions

It is increasingly common to share a table with people who think that they must inform you of the nutrients contained in each food on the plate. If you ask for sardines they remind you of their high Omega-3 content; if it is broccoli then how to ignore its anticancer properties; if it is eaten with tea (more and more frequent) its antioxidant and diuretic potential is celebrated; if the salad has nuts, the energy power and the cardiovascular benefits are mentioned; if it is salmon, you have to remember that with each bite we are kicking bad

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cholesterol; kale seasoned with a little oil is not fattening, satiates and nourishes like no other cabbage; if we prepare a white omelette, only with egg whites, we get rid of that which contributes nothing and only makes us fat, and so on, ad infinitum. I confess, I can't handle that much.

I am outraged by this tendency to judge food by erasing any hedonistic or social aspect, which ultimately surely has a more decisive effect on well-being than the strict relationship of its properties. I read that the cool creatives of Silicon Valley are enthusiastic about some powders called Soylent that, mixed with water, prevent you from having the bad taste of eating a plate of food as God intended. Soylent is a nutritional compound that was designed in 2003 by a software engineer in order to save money and not waste time in either the preparation of food nor in that precious half hour that goes into consuming it. This diet, which is taken with a straw and means the executive does not have to look away from the computer, is not accepted by science as a substitute for food, but there are modernists who are embracing it with enthusiasm. I believe that it is nothing more than a lack of respect towards those who do not have food to put in their mouth.

Elvira Lindo

1. What is the subject of the text?
2. What does the word 'hedonist' mean? If you don't know it, try to define it according to the linguistic context in which it is used.
3. What is the function of the "Soylent" product?
4. What does the author think about current eating trends?
5. What are the characteristics of the language of the text? Where could we find a text like this?
6. If you had to propose a title for the writing, what would it be?

Read the following text by Jose Confuso and complete the activities

The summer of influencers. Sorry, the influencers' summer, now you have to say everything in English. As if it were a bad dream, one of those naps under the umbrella after having eaten a paella watered with sangria, summer filled us with scholars, enlightened technology, magicians of social networks. They call themselves influencers and presume to create a school, to mobilise the masses, to raise the people against the gentrification of styling. They raise their fists and conquer a Zara. They are the low-cost Marx. The Che Guevara of trends. But with a beret. Or a straw borsalino, which is very hot.

But what the hell is an influencer? That is what many of us have been wondering for years. Thanks to the premiere of programs like *Quiero ser*, the fashion talent show hosted by *Sara Carbonero,* the public has approached a phenomenon that has us saturated. An influencer is nothing more than a fashion lover — see, buy clothes and put them on—who lives by accumulating followers on social networks thanks to their innate ability to combine clothes and, fundamentally, look handsome in photos. The art of cheek biting. Zoolanders of life who started a blog when they began to emerge and now act as kings of the show.

But #beware, what seems like just a hobby is a more than beneficial livelihood. As soon as you hang up an influencer label—don't call them bloggers, they don't like it anymore—brands go crazy to send you gifts and promotional samples. And you, of course, overjoyed, run to share them on your social networks, praising their benefits and encouraging your thousands of followers to do the same. And all for your pretty face! Well, and for a substantial amount of money if the number of followers allows it—more Ks, more euros.

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1337   Such is the volume of product placement that even the US government has decided
1338 to get involved in the matter. The Federal Competition Commission has announced that
1339 it will require influencers to clearly identify posts sponsored by brands. And it won't
1340 do to sneak the hashtags #ad or #sponsored into a cloud of thirty-five tags at the end
1341 of each image on Instagram. Business is faltering. Where now is that spontaneity, that
1342 natural impudence, that connection with the common people that the kings of the selfie
1343 promise?

1344   Far from transmitting the real functioning of the fashion industry, the influencer phe-
1345 nomenon has only served to create monsters. We have made an entire generation believe
1346 that you don't have to do anything to succeed in life. Just put on some clothes, take four
1347 photos, and upload them to Instagram. Live the millennial dream. And the worst thing is
1348 that they are right. Now even my beloved mother knows what an it girl is. I fear the day
1349 that I discover Instagram stories and fill my timeline with videos of making faces. "Do
1350 you know what contouring is?" he asks me. And, of course, my soul falls to my feet. I will
1351 never forgive you, Paula Echevarría. Never.

1352   *Jose Confuso*

1353 1.   What is the author's intention? Mark the answer that you consider the most correct with
1354   an X.

1355   a.   Inform about a new profession related to fashion.
1356   b.   List the different advantages of being an influencer.
1357   c.   Criticise the impact that the influencers' way of life is having on young people.

1358 2.   Complete the following table with words extracted from the text (3 of each type):

Nouns	Adjectives	Verbs	Adverbs

1359

1360 3.   Answer the following questions:

1361   e.   What references to historical figures appear in the writing?
1362   f.   Identify an expression in the text that means "to produce sadness".
1363   g.   What differences and similarities do you find between this text and the text by Elvira
1364   Lindo (subject, language, target audience, etc.)? Did you experience the same sensa-
1365   tions when reading them? Why?
1366   h.   If you had to propose a title for the writing, what would it be?

1367

1371 **Declarations**

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