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Article abstract

In this paper, the role played in learning to argue by an essential and yet under-researched epistemic and argumentative norm is discussed, namely, the consistency requirement. An argumentative intervention is presented, that is designed to enhance the understanding of this norm among high school students, to enable them to recognize contradictions in the process of argumentation and to familiarize them with the argumentative strategies related to the reductio ad absurdum. There follows a description of how the designed intervention was implemented in two Italian high schools, which served as an exploratory case study, and the results obtained are discussed.

Educating Students to Consistency via Argumentation

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Abstract: In this paper, the role played in learning to argue by an essential and yet under-researched epistemic and argumentative norm is discussed, namely, the consistency requirement. An argumentative intervention is presented, that is designed to enhance the understanding of this norm among high school students, to enable them to recognize contradictions in the process of argumentation and to familiarize them with the argumentative strategies related to the *reductio ad absurdum*. There follows a description of how the designed intervention was implemented in two Italian high schools, which served as an exploratory case study, and the results obtained are discussed.

Résumé: Dans cet article, on discute du rôle joué par l'exigence de cohérence, une norme épistémique et argumentative essentielle et encore peu étudiée, dans l'apprentissage d'argumentation.
On présente une intervention argumentative, conçue pour améliorer la compréhension de cette norme parmi les étudiants du secondaire pour leur permettre de reconnaître les contradictions dans le processus d'argumentation et de se familiariser avec les stratégies argumentatives liées à la réduction à l'absurde. Suit une description de la manière dont l'intervention conçue a été mise en œuvre dans deux lycées italiens, qui a servi d'étude de cas exploratoire, et les résultats obtenus sont discutés.

Keywords: argumentation, contradiction, coherence, consistency, education, *reductio ad absurdum*

1. Introduction

This paper contends that more attention should be paid to the role of the consistency requirement, that is, the requirement to be non-contradictory, in learning to argue research, and reports on the present researcher's efforts to design and test, by means of an exploratory case study, which involved two Italian high schools, a school

intervention aimed at promoting the learning of consistency by high-school students via argumentation.

In the first place, why should research on learning to argue devote more attention to the consistency requirement?

Consistency and inconsistency have been regarded as key aspects of argumentation since antiquity (see van Eemeren et al. 2014, Chapters 1 and 2), and still nowadays teaching argumentation and critical thinking should mean, *inter alia*, acquainting students with these concepts (see, for example, van Eemeren and Snoeck Henkemans 2017; Barnet and Bedau 2014; Sinnott-Armstrong and Fogelin 2010; Walton 2006). Why? Van Eemeren and Snoeck Henkemans refer to these concepts when addressing the soundness of argumentation: they claim that "when evaluating argumentation, this argumentation must first be checked for logical and pragmatic inconsistencies" (2017, p.79). In this context, *logical inconsistency* means containing two contradictory statements, while a *pragmatic inconsistency* occurs when two statements have contradictory consequences in the real world or imply states of affairs that cannot hold together, simultaneously (see p. 80). Barnet and Bedau, on the contrary, introduce consistency and inconsistency when explaining the *reductio ad absurdum* strategy, "one of the most powerful and dramatic forms of argument" (Barnet and Bedau 2014, p. 356), in which while attempting to refute your position, "I start out by assuming the very opposite of what I believe or favor and try to establish a contradiction that results from following out the consequences of this initial assumption" (p. 357). In fact, this explanation relies on ideas "fundamental to logic, that of contradiction, or inconsistency" (p. 357), and that "the opposite of contradiction is consistency" (p. 357). As Sinnott-Armstrong and Fogelin (2010) and Walton (2006) stress, once a person is accused of inconsistency, then "her reliability is in question until you have some explanation of why she would say different things at different times" (Sinnott-Armstrong and Fogelin 2010, p. 357), because "when you have an inconsistent pair of statements, it is not possible for them both to be true" (Walton 2006, p. 45), and so there is something wrong with the argumentation, which should be revised. Among argumentation schemes, representing common types of argumentation in dialogues, Walton describes precisely the argumentation scheme for argument from inconsistent

commitment[1] and its subtype, the argumentation scheme for the circumstantial *ad hominem* argument[2], a subtle and powerful form of attack, "because it uses the allegation of inconsistency as evidence that the arguer criticized may be a liar or a hypocrite, or even that he may be so logically incompetent that he can't even follow his own argument" (Walton 2008, p. 177). These types of arguments appear to be closely related to the *reductio*. This is definitely a "method of refutation that consists in deriving from a standpoint to be refuted two consequences that contradict one another" (van Eemeren et al. 2014, p. 54), but what one concretely tries to do by means of this argumentative strategy in a conversation might be illustrated as follows: I, pretending to consider your position true (even if, in reality, I do not agree with it) and reasoning about it together with you, show you that by holding that position together with other positions that you demonstrably hold true (either because you said so or because your behavior gave evidence of it), you contradict yourself in the end. Hence, contradiction is not derived from your standpoint alone, but rather depends on the fact that that position held gives rise to an inconsistency among your own beliefs. This might mean either (generously) that you are confused about your own beliefs or (less generously) that you are a hypocrite or a liar.

Being that argumentation is a means to resolve disagreements - and is taught to students also to enable them to resolve disagreements! - it is not surprising that the relevance of these concepts and of the related strategic conversational moves should also emerge from the philosophical debate on (deep) disagreements. Referring to the work of Robert Fogelin, in this debate the following are usually differentiated: normal disagreements and non-normal ones, so-called

[1] This could be reconstructed as follows: "*a* has claimed or indicated that he is committed to proposition *A* (generally or in virtue of what he said in the past)" but "other evidence in this particular case shows that *a* is not really committed to *A*"; hence, "*a*'s commitments are inconsistent" (Walton 2006, p. 120).

[2] This could be reconstructed as follows: "*a* advocates argument α, which has proposition *A* as its conclusion" but in reality, "*a* is personally committed to the opposite (negation) of *A*, as shown by commitments expressed in his or her personal actions or personal circumstances expressing such commitments"; hence, "*a*'s credibility as a sincere person who believes in his own argument has been put into question (by the two premises above)" and in conclusion "the plausibility of *a*'s argument α is decreased or destroyed" (Walton 2006, p. 125).

deep disagreements, in which contrasting parties may be both "unbiased, free of prejudice, consistent, coherent, precise and rigorous" (Fogelin 2005, p. 8), but nonetheless disagree. Testing the internal coherence (here "the consistency") of a position is certainly one of the procedures implemented to resolve normal disagreement, but in his critical analysis of the critiques targeting Fogelin's position, Maurice Finocchiaro (Finocchiaro and Godden 2011) provides evidence of the presence of attention to the argumentative strategy *reductio ad absurdum* that also exists in the literature on deep disagreements (see his discussion of Davson-Galle 1992 and Johnstone 1952, 1959 and 1978). As noted above, the usage of this strategy is evidently related in a direct manner to the consideration of the consistency requirement.

The relevance of this topic seems, however, to be recognized even outside scholarly contexts: at the level of global education policies, the Organization for Economic Cooperation and Development (OECD) stresses the importance of fostering critical thinking skills in order to promote global competency for a more inclusive society, and those critical thinking skills are those which "are used for evaluating the worth, validity and reliability of any material on the basis of its internal consistency, and its consistency with evidence and with one's own knowledge and experience." (OECD 2016, p. 9). Hence, developing critical thinking skills in students should involve familiarizing them with consistency, as this norm is inherently connected to epistemic trust and vigilance (Sperber et al. 2010). This is not surprising, given that Ennis (2000) also referred to the criteria "The proposed conclusion is consistent with all known fact" and "Competitive alternative explanations are inconsistent with facts" to characterize one of the abilities required from ideal critical thinkers (namely number 7: "Induce, and judge induction"), but it is interesting exactly because of its occurring outside of the scholarly context. This might suggest that the increasing complexity of current-day societies, whose members are required every day to face and assess a large amount of alternative and often contrasting information, makes the task of familiarizing students with criteria such as consistency relevant and urgent.

However, despite this urgency and the fact that an interest in the role of the consistency requirement in argumentation goes back to

the classics, this norm appears to be insufficiently focused on in recent learning to argue research, even in a context in which a great amount of contemporary research has been devoted to improving both students' argumentative skills and single-discipline learning by means of argumentation (Müller Mirza and Perret-Clermont 2009). While a great deal of attention has been paid to the role of evidence (Asterhan and Schwarz 2016; Macagno 2016; Osborne, Erduran and Simon 2004; Rapanta, Garcia-Mila and Gilabert 2013), less manifest interest has been demonstrated in enabling students to evaluate the internal consistency of their respective stances in the argumentation. Ambiguity arises even in the usage of the term *consistency*: *coherence* is better known than consistency, and both terms can be used in a sense much broader than "to be non-contradictory". In particular, by *coherence* what is sometimes meant is connectedness, which refers to the link among the ideas presented (Schwarz and De Groot 2007), or relevance, which similarly refers to the cohesion of an argument, to the inferential connection between a statement and the conclusion it is aimed to support (Macagno 2016; Walton and Macagno 2016). Thus, improving students' argumentative coherence would result in helping them to examine and assess the logic of the connections between reasons and positions (e.g., Reznitskaya and Wilkinson 2017a), but without any specific mention of the requirement to be non-contradictory. This ambiguity reflects, in fact, the lack of field studies specifically focused on this requirement: the roles played by contradictions, consistency and the *reductio ad absurdum* seem, in some cases, to be recognized but not directly addressed. Significant examples are the works of Felton (2004) and Macagno, Mayweg-Paus and Kuhn (2015). In these two studies, the authors report of students' attempts to force their opponents to take a position on a case or a scenario that would be contradictory to their previous stances on the topic (Felton 2004) and of cases of students addressing the roots of disagreements by showing attempts "to challenge the principles underlying the viewpoints, pointing out internal contradictions" (Macagno, Mayweg-Paus and Kuhn 2015, p. 531). Further examples, nearer to the area of arguing to learn science, are the work of Jiménez-Aleixandre and colleagues (2000), who report on students' appeals to consistency in developing argumentation for doing science, and a study by Sampson and colleagues (2010), who

place ‘consistency with other ideas’ among the theoretical criteria for a good-quality scientific argument. However, a study focusing on promoting the understanding and mastery of consistency among students as its prime aim seems to be absent.

This lack of a specific interest might be, perhaps, traceable back to the way modern studies on argumentation were born: Toulmin, considered together with Perelman and Olbrechts-Tyteca one of the "instigators of modern theories of argumentation" (Schwarz and Baker 2017, p. 57), detecting in formal logicians the attitude to treat all arguments as if they were analytic and to behave as if concepts like consistency, contradiction and entailment were almost sufficient for an exhaustive consideration of argumentation processes in general, distanced himself from formal logicians and from those concepts. He maintained that “for certain purposes, considerations of consistency and contradiction may be relevant, even when arguments we are discussing are substantial” and not analytic (Toulmin 2003, p. 156), but this relevance seemed to be confined to the first steps of the argumentation, the elimination of contradictions being a prerequisite of an intelligible expression of an arguer’s thought.

But is not this elimination already a process of evaluation that an arguer should master and students should be enabled to conduct? Is this rational assessment of consistency confinable to the preconditions of argumentation?

Aristotle first, together with the authors he mentions in his works (*Topics*, *Sophistical Refutations*) as the inventors of the dialectic (Zeno, Socrates, Plato), would agree that evaluating the internal consistency of opposing parties in argumentation is a process that cannot be considered as concerning only its preliminary phase (see van Eemeren et al. 2014, Chapters 1 and 2). This assessment runs throughout the argumentation and comes into play many times, first of all because the very act of supporting a thesis by means of reasons occurs many times in a discussion, and considering the generated arguments as valid implies regarding them as internally consistent and suggests that it would be inconsistent for the interlocutor to accept the premises of one of those arguments while denying or doubting its conclusion, and secondly and consequently, because the internal consistency of any argument and that of any new arguer’s argumentative move with his previous commitments should be

cooperatively evaluated by the discussants each time new claims are advanced. In fact, one of the points that discussants should determine, by means of argumentation, is exactly whether a specific standpoint is compatible with the starting points of the discussion and with the consequences that can be drawn from them.

Recent studies of argumentation theory provide evidence for this standpoint: Macagno and Walton (2017), in examining the dialectical usage of quotations for supporting one's own position and challenging an opposing one, acknowledge that this usage is based on the requirement that an arguer's commitments must be consistent. A quotation of this type could be used, in fact, either to show that an arguer is contradicting his previous claims (ideals, beliefs, behaviors, actions, etc...) with his current claims (and, consequently, he or she is unreliable), or that he should accept the speaker's position due to its being coherent with his previous commitments. The first usage is certainly an example of an appeal-to-consistency requirement in counterargument, which is an essential middle step in the process of argumentation and not preliminary to it. Moreover, the use of this kind of quotation appears strictly related to a move like the argument from inconsistent commitment and the circumstantial *ad hominem* argument introduced above (see Walton 2006; 2008), which are forms of argumentative criticisms which take place within a discussion.

Hence, given all these reasons, research on learning to argue should perhaps start exploring the question of consistency more deeply. A first attempt to do so will be now described.

2. Method (i): An argumentative intervention focused on consistency

Extended engagement in argumentation with peers seems to lead to an enhanced meta-level understanding of discourse norms (Kuhn et al. 2013): is this true also for the consistency requirement? And how should an argumentative intervention directed at high-school students be designed for the purpose of fostering their competence related to consistency? As a base for the development of such an intervention, it was decided to make close reference to the curriculum described in Kuhn and Udell (2003) and Kuhn (2005). After an

initial assessment phase (the pre-test described in the section which follows) and brief theoretical instruction whereby contradiction, consistency (coherence) and the *reductio ad absurdum* are defined[3], students participate in an activity cycle similar to the one described in those studies, but with some relevant modifications due to the different scopes.

As in the argumentative intervention referenced above, adult experts act as coaches of two teams of students, a pro-capital punishment (CP) team and a con-CP one. The coaches are instructed to minimize direct interaction with students (they cannot become the principal interlocutors of their team members) but guide them to focus their attention in the discussion on specific goals that are expressed through prompts that students are invited to follow. Schemes that are useful for visualizing and remembering the prompts, are provided to students by their coaches during each activity session. Coaches are committed to providing students with the opportunity to reflect and debate in the following tasks.

Generating Reasons: Team members, divided into small groups of possibly four to six students, are invited to recall the reasons collected during the pre-test phase in support of their view, to generate additional ones and to discuss these reasons with their teammates. Students' small groups are encouraged by their coach to recognize that different reasons may support the same view and that, in some cases, reasons seem different at first but, once interpreted, they may have the same meaning. Discussing whether reasons are duplicates is a first, important, step in making clear personal understandings of the topic. The coach can add at most one reason to the discussion, if major gaps are present.

Reasons for Reasons (the premises of our reasons): Team members, divided into small groups, are invited to reflect on what the

[3] Also considered was: to present in this introduction, and to use in the activities, a framework of principles, which should be common to both teams, with the aim to help students to avoid "clashes of intuitions" (e.g., "It is so. Why? But it's absolutely clear! I don't understand why you cannot see it!") and to recognize contradictions in argumentation (e.g., "Doesn't it look like there might be a contradiction with the principle that…?"). However, students did not feel this framework to be binding, and during the intervention used the principles as if they were just other informational sources.

bases are for the reasons they asserted. They are encouraged to recognize that each reason depends on other (often implicitly assumed) reasons. To accomplish this task, they are prompted by their respective coaches to question and discuss the "why", "when" and "where" of the reasons they collected in the previous activity: they are scaffolded through the use of argumentation prompts like "Why do you think that?", "How do you know?", "What is the evidence for your view?" (Osborne, Erduran and Simon 2004); or "Is it always true?", "Is it true everywhere?" (Reznitskaya and Wilkinson 2017a). Students are provided with informational sources such as texts, data and the like that can foster the discussion.

Clarify Reasons: As stressed by von Aufschnaiter and colleagues (von Aufschnaiter et al. 2008), students must be aware of the eventual differences in their individual understanding and be able to construct a shared one in order to address and challenge the opposing standings. Therefore, team members, divided into small groups, are invited by their coach to reflect on the fact that the same term or expression might be used in different ways and with different meanings while different terms and expressions might be used with the same intended meaning and intention. Students are provided with examples from contemporary, thorny debates, such as those around abortion and euthanasia.

Where Are We Going? (the consequences of our reasons): Team members, divided into small groups, are encouraged to reflect on the possible consequences inferable from what they support. They are guided to do so from their own point of view as well as from their opponents', by also considering the consequences which an opponent might draw. After this, they are invited to discuss whether consequences, reasons, reasons for reasons and the thesis are in accord or at odds one with another. Accord and discord are used as a preliminary, intuitive introduction to reflect on contradictions. They are scaffolded through the use of the Aristotelian square of opposition, in order to understand which kinds of opposition exists among the statements supported: they are invited to reflect on the fact that when they say "always", "everywhere", "in every state", "never" and so on, they are in the realm of universal propositions; on the contrary, when they use expressions like "sometimes", "in some cases", "there is an exception", "there is at least one case in which ...", "it is not

always valid but only when ...", "sometimes it is valid, sometimes not", they are in the field of particular ones. They need to ensure their statements can be held together!

Developing Reasons into an Argument: Initially in small groups and then all together, the team works to build and format, on colored poster boards, an argument based on what they have done up to now. This activity favors discussion about which reasons to use and how to connect them. After having constructed the argument, each team is divided into two subgroups: the "advocates", who have to explain and defend the argument in front of the other teammates, and the "jury", who are encouraged to criticize it by finding its weaknesses. Prompts, such as "Can you think of an argument against your view?" (Osborne, Erduran and Simon 2004), are used.

Examining and Evaluating the Opposing Side's Reasons: The coach provides the team with the opposing team's poster boards, so that the two teams can exchange their arguments. Students, divided again into small groups, are asked to consider and evaluate the opposing side's arguments by restating the criteria previously adopted in their own work: they are encouraged to identify the reasons supporting the argument, the implicit premises; to scrutinize the usage of terms and expressions and the consequences inferred.

Generating a Reductio ad Absurdum: Team members, divided into small groups, are encouraged to concentrate on the counterarguments they should have begun to generate spontaneously in the preceding activity, in which they should also have used the square of opposition and discussed whether any or which kind of opposition exists among the statements supported by the opponents in their argument. The coach urges students to discuss whether contradictory statements are present and to try to use them for generating a *reductio ad absurdum*. The coach provides team members with examples of the *reductio* from contemporary, thorny debates, such as the one on immigration: the examples should comprise both exemplifications of the above-mentioned dialectic quotations, as described in Macagno and Walton (2017), and applications of the *case-cornering* strategy. Referring to the assessment scheme developed by Felton and Kuhn (2001), when coordinating *counter-c* (a disagreement offering a critique of the opposing utterance) and *case-?* (a request for the opposing partner to take a position on a particular case or

scenario) in *case-cornering*, students seem to succeed in forcing the opponents to take a position on a case or a scenario that would be contradictory to their previous stances on the topic. The example reported by Felton (2004, p. 47) is as follows:

> A: If your mother did a crime, would you want her [...] to get the death penalty or live that you could see her in a jail?
> B: Well, I would pick that she'll live, but...
> A: Alright, wait, excuse me, hold on a second. You just said that you'd pick that she lives so I don't understand why you are for the death penalty 'cos it doesn't matter. Right now you're a hypocrite [...]. You just contradicted yourself.

Actually, as the author himself acknowledges, Subject B could just reply that he would prefer the jail solution for his mother, even if she deserved the capital punishment. It might be just a concession to family affections rather than a real inconsistency in Subject B's argument. Nonetheless, this example clearly represents an attempt at the *reductio ad absurdum*, and case-cornering strategy might be used for producing real instances of it.

Generating Rebuttal to Others' Counterarguments: The coaches provide their respective teams with the opposing side's counterarguments and the teams, working in small groups, repeat the work done in the preceding activity.

Developing an Argumentative Draft for the Showdown: Initially in small groups and then all together, the team works to build an argument for the final showdown, based on what they have done up to now. This favors discussion on whether and how the opportunity to examine and evaluate the opposing side's arguments and counterarguments improved their own arguments. For example, after the work on recognizing and possibly constructing a *reductio ad absurdum* to oppose to the opposing side's arguments, students might now be able to revise and enhance their own argumentation by anticipating inconsistency allegations. After having constructed the argument, each team is divided again into "advocates" and "jury", with the proviso that those who previously belonged to a jury now belongs to an advocates' group and vice versa.

After this cycle of activities, the teams go through a final assessment phase and then meet with external judges for a final showdown

in which different speakers alternate with the proviso that no student is allowed to speak for more than one minute and that at most three "huddles" might be requested to confer.

3. Method (ii): Performance measures

How should awareness of the basic norm of consistency be assessed? As in Kuhn and Udell (2003) and Kuhn (2005), a pre- and post-test assessment system, presenting an individual and a dialogic argument evaluation phase, is adopted. However, due to the different focus of this work, a third phase is also added, here, to these two to enrich pre- and post-test assessment. Hence, before the intervention begins and after the end of the activities cycle, students' argumentative skills and knowledge related to consistency are evaluated in the following three-phase way.

In the first phase, students are invited to take a position on the question of capital punishment and to write a short essay supporting and justifying their standpoint. This first measure is usually meant to evaluate students' individual argument skills, but for the scope of this intervention, it is used primarily to make them begin collecting reasons for their position. However, particular attention should be paid to the question of whether students appeal to consistency in their essays or not. They are given 20 minutes to accomplish this task.

In the second phase, each student is paired with an opposing partner, and they are given 20 minutes to discuss their respective standpoints on the topics. They are instructed on discussing seriously on the issue of whether a person should be put to death in the case of grave crimes and invited to compare their reasons and the roots of their disagreement. This second measure is usually meant to evaluate a general development in students' dialogic argumentative skills but, for the scope of this intervention, it is used primarily to identify the frequency of students' explicit appeals to consistency, with the consequent use of the corresponding counter-argumentative strategies (e.g., dialectical quotations or case-cornering moves that resemble the form of a *reductio ad absurdum*). It was decided to focus only on the explicit appeals, without considering the implicit ones, in order to be sure that the students are aware of what they are doing, of which

argumentative strategies they are implementing, and thereby to avoid interpretative mistakes about their argumentative intentions.

In the third phase, students are asked to explain what they already know about contradictions, consistency and the *reductio ad absurdum* strategy and to decide whether a given text contains examples of contradictions and the *reductio* or not. They are given 60 minutes to accomplish this last task.

4. Method (iii): An exploratory case study

The designed intervention was proposed to two Italian high schools in Treviso province (near Venice). The number of hours at the disposal of the study was 16 for both schools, distributed over eight weekly 120-minute-long afternoon meetings. This timeline was decided by combining a preliminary estimate of the length of the activities with the schools' needs and time availability. In the case of both schools, the first meeting and the second-to-last one were devoted to pre- and post-assessment, while the last one was used for the showdown and the conclusive reflection time, and the five central meetings (meetings between the first and second-to-last) were used for the theoretical introduction and the argumentative activities. Furthermore, coaches had been instructed in using the last 10-15 minutes of each activity meeting to gather the whole team, from their small groups, and reflect together on the work done and on the difficulties encountered. This work of reflection was meant to enhance the effects of the preceding activities.

A total of 55, 16-to-19-year-old students (around three-fifths of whom were 17 years old), participated in the program. However, seven began but did not complete the study and, due to overlap with other school activities, of the remaining 48, only 31 attended the meetings steadily ($\geq$ 80% of the five central meetings). Within this group, only 20 took part in both the pre- and post-assessment, in all the three phases. Of all the participants, 41 were girls and 14 were boys. Of the final 20, 18 were girls and two were boys. Four philosophy teachers, two men and two women, were asked to collaborate as coaches and were trained before the beginning of the intervention.

5. Results and discussion

Given the complexity of the concepts and the strategies at stake, and given the explorative nature of this small study, the size of the effect on students' argumentative skills was expected to be limited, and so it was.

For the purposes of the intervention, only the material produced by students' participating steadily in the meetings and who took part in both pre- and post-assessment, in all the three phases, are considered. Hence, a total of 16 pre- and post-assessment productions were examined. This number differs from the one previously indicated because the productions of four students were excluded since the dialogue recordings were compromised.

The comparison between pre- and post-assessment results showed the following differences. Concerning the essays (assessment form 1), in the pre-assessment phase, only one student mentioned *contradiction* in her text when explaining the reasons supporting her position and challenging the ones of an ideal opponent. In the post-assessment phase, the number of students who referred to contradiction (namely saying "contradiction", "contradictory", "contradicted each other") in their essays increased to three. The low number for both pre- and post-tests is actually not surprising, given that appeals to consistency generally involve referring to an interlocutor's position, and few students were expected to be able to go beyond purely supporting their own positions in this individual assessment phase.

What is, indeed, quite interesting is the discrepancy between the results of assessment forms 2 and 3: while the results of the third-phase of the post-test underlined a significant growth in students' awareness and understanding of what contradictions, consistency and the *reductio ad absurdum* are, the post-test dialogues gave evidence of their difficulty in applying this improved knowledge to conversations.

Concerning the third performance measure form, deciding how to analyze and present the results was definitely not easy given that there are so many ways for kids to say things (and make mistakes). It was decided to leave the question of whether the students succeeded in recognizing examples of contradictions and *reductio* in the

given text for another eventual paper, because it would deserve much more space enabling it to be treated in detail. In the present study, it was decided to explore and present only what they already knew about contradictions, consistency and the *reductio ad absurdum* strategy. To try to limit the degree of interpretation ("okay, I see that you want to say that thing, even if you don't say it explicitly"), which risks, perhaps, introducing too much researcher subjectivity into the reading of the data, the frequency of the occurrence of certain words and/or expressions in the answers was used as a reference. The risk of this choice is clearly that there might be answers not appearing in the count that we could have guessed to be adequate, as well as inadequate answers appearing in it just because a word or expression is mentioned.

For example, in exploring students' answers to the question about contradiction (question 1 of the third phase), specific attention was paid to the presence of an explicit reference to negation. As contradiction, in fact, is not a vague form of opposition but a specific one involving the idea of negation—two contradictory statements are each the negation of the other, so that when one is false the other must be true, and when one is true the other must be false, and vice versa—it seemed useful to focus on negation to investigate whether students were able to distinguish vague forms of opposition (which might also comprise *contraries* and *sub-contraries*, to use Aristotelian technical vocabulary) from genuine contradictories. In the pretest phase results, all students demonstrated having an idea of contradiction as a form of opposition between two poles (statements, ideas, beliefs, concepts, and so on), but only four mentioned negation—*negazione* (negation) as substantive or forms of the verb *negare* (negate, deny)—in their answer to question 1 and, despite that, all four seemed either very vague or inadequate (e.g., "CONTRADICTION: concept / thought that negates or affirms the exact opposite" [4]). When explaining what they knew about consistency, in general students seemed to understand it either as acting in accord with one's own ideas or as remaining faithful to one's own ideas or as adherence to a topic, or more than one of these together. Only four

[4] All these translations from Italian to English of students' productions were made by the researcher.

students referred to the absence of contradiction—mentioning expressions such as *contradiction*, *contradictory*, or using the verb *to contradict oneself*[5]—in their answers. As concerns the *reductio ad absurdum* strategy, only three students out of the 16 made reference to contradiction—mentioning expressions such as *contradiction*, *contradictory*, or using the verb *to contradict oneself* —in their answer to question 3, and, two of these three, in an inappropriate way, e.g., "The reductio ad absurdum is a demonstration of a certain thesis in which we use statements non-concrete and not based on something really scientific and demonstrable to support the basic thesis. The reasoning is very 'twisted' and can often fall into contradiction because it is not based on real data, but only on abstract ideas." Most made no reference to contradiction. In some cases, this strategy was explained as one in which an interlocutor appeals to absurd or unreal elements/arguments in her reasoning.

On the contrary, in the post-assessment phase, some significant improvements were noticed: nine out of the 16 made reference to contradiction when answering the question on the *reductio ad absurdum*, and only in one case did the answer nevertheless appear too inadequate to be accepted. Regarding consistency, the number of students referring to "contradiction" to appropriately characterize this concept—mentioning terms like *contradiction*, *contradictory*, or using the verb *to contradict oneself*—increased to nine. In addition to these, two students used the verb *contradict* in their answers, which seemed, however, insufficient to render these answers precise. References to negation to characterize contradiction did not increase in number (remaining at four), but all four seemed to be either quite adequate or very appropriate (e.g., "Contradiction is the assertion of a thing and its negation at the same time or immediately after. When a contradiction is present, we enter the field of impossible, because the same concept cannot be affirmed and denied at the same time.").

However, it is interesting that this increased understanding did not result in an equal enhancement of students' dialogic skills. Consistent with previous studies, in fact, students seemed to show a general improvement in what Goldstein, Crowell and Kuhn (2009)

[5] These and the following ones are clearly the translated versions of the expressions effectively used by the students.

stressed as a "key evolution" (p. 384) in the production of dialogic argumentation, that is, the transition from juxtaposing alternatives to making attempts at identifying weaknesses in the opponent's arguments; however, with reference to the specific focus of this work, few students showed the ability (or the will) to translate their deeper understanding of the consistency requirement and of the *reductio ad absurdum* into practice. Explicit appeals to consistency increased little in frequency among the participants from the initial to the final assessment. From one vague mention across the 16 students in the pre-assessment phase ("…and we would be a little inconsistent…"), in the post-assessment phase, the number of students appealing explicitly to it only increased to three. Consider the following excerpt from a post-test discussion as the best students' attempt to produce a *reductio ad absurdum*:

> A: When has a criminal that murdered someone cared about, was interested in…
> B: But, in fact, he went wrong and is punished!
> A: And why can't I punish him by killing him?
> B: Because, well, you say that…
> A: He refuses to abide by the laws, why should I comply with them?
> B: Precisely, now: you, saying "I"…
> A: Uhm
> B: … mean…
> A: The state.
> B: …the state, right?
> A: Yes, yes, yes, yes.
> B: The state means all the citizens, right?
> A: Yes, I sort of mean all the magistracies, that kind of thing…
> B: Exactly, hence, you are saying that it is right that all citizens…
> A: Uhm uhm
> B: …can…I mean, you are saying that all citizens can kill, while the single one cannot kill. I mean, can you see the contradiction?

The student is clearly building her strategy on the vagueness of "all": should the state be considered as every single citizen or as a distinct entity that is separate from its components? Nonetheless, she succeeded in implementing a clear and deliberate attempt at the *reductio* (which is vaguely reminiscent of the question and answer technique of Socratic dialogues): if you accept that all citizens (the state) are

allowed to kill, then a single one should be allowed to as well; if not, you contradict yourself.

The limited size of the effect on students' dialogic argumentative skills may definitely point to the difficulty of the argumentative strategy under consideration. The complexity of seeking to establish an inconsistency in the interlocutor's position cannot be overestimated: this is really a sophisticated argument strategy (Kuhn 2005, p. 160), even when students are relatively old. Furthermore, it might also depend on the fact that the task was not to criticize the inconsistency of the opposite side, but rather to "discuss seriously the issue", and it is possible to discuss an issue seriously without engaging in a *reductio ad absurdum*. This might happen either because no contradiction is present in the interlocutor's speech, or because pointing out inconsistencies might be regarded as a quite confrontational and agonistic style of arguing, and one might prefer an argumentative yet more cooperative and inquisitive manner.

However, the question may be raised whether and to what extent the situation highlighted by the results reflects general teaching and learning methods: while students are accustomed to acquiring theoretical knowledge transmitted by teachers, they are less acquainted with discussions and dialogues where this understanding may be applied because the opportunities for students to engage in discussions and argumentations meant to develop their reasoning and arguing abilities are still too few (e.g., see Osborne 2010 for the paradigmatic case of science education). Hence, they have less difficulty in understanding concepts than in using the argumentative strategies related to them.

The effects of this lack were observed in some ways during the activities cycle, as well, in which there were participants who seemed to have difficulty in getting involved in the continuing process of examination and comparison of ideas and beliefs that the activities implied. Being deeply adapted to frontal class lessons, at the beginning of the intervention most students struggled to make sense of this different educational approach; however, in a few cases, this difficulty seemed to be caused, instead, by a consideration of knowledge as being at the same time subjective and fixed. Mixing in some way the absolutist and multiplist stages of epistemological development described in Kuhn (2005), there were students—

unsurprisingly, among the ones who did not attend steadily—who, when working in groups, refused to use the provided informational sources, explaining their choice with non-epistemic justifications like "it is right because it is so" (and therefore, there is no need to deal with the sources), but at the same time appealed in their discussions to the equal validity of all opinions. These students appeared both to refuse to put into doubt personal standpoints, because they were persuaded they were right, and disposed to accept the equal validity of an opinion incompatible with theirs. Either way, even students who had participated steadily in the meetings frequently used, in the post-test recorded dialogues, expressions such as *in my opinion*, *in my view*, *for me*, *I believe that*, confirming their difficulty developing an evaluative attitude to the quality of arguments already registered (e.g. Kuhn 1992); the awareness that the merits of an argument should be (at least partly) independent from personal points of view struggled to emerge.

To conclude, it is conceivable, however, that an argumentative intervention like this, focussed on consistency, might help to work towards the development of an evaluative attitude in students. One question that sounds reasonable, in fact, and worthy of future deepening is whether—in addition to an enhanced understanding of the concepts and of the argumentative moves at stake—working with consistency might increase students' willingness to ask questions as well as their willingness to attempt to clarify concepts, positions and implicit commitments. In fact, processes such as elaborating and clarifying whether and why two standpoints are or are not in contradiction, as well as eventually generating a *reductio ad absurdum*, imply identifying unstated reasons, defining terms (and judging definitions), asking and answering clarification questions, identifying or formulating questions, etc. Ennis (2000) also referred to these very processes when outlining the abilities of ideal critical thinkers, and the subject who appealed to consistency in the excerpt above tried to deploy precisely those in constructing the *reductio*.

6. Conclusion

How should the question concerning the success of the program be answered? Did the participants improve their understanding of

consistency? Some did almost certainly, some others maybe did not. The only ambition of this little, explorative work was to draw attention to the role of the consistency requirement in argumentation and education, without pretending to provide an exhaustive answer to the question of how to delve into it in learning to argue research, although it does offer a preliminary and very limited one. In a post-truth world, where "knowledge is seen as entirely subjective, as if there are no established methods to judge the soundness of different arguments or to reconcile opposing opinions" (Reznitskaya and Wilkinson 2017b, p. 33) and the amount of fake news increases day-by-day, striving towards the development of the understanding of this norm among students—future citizens of global communities—and the continuing improvement of learning interventions meant to enhance it is essential. A renovated truth-seeking orientation of argumentation in education calls for it.

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