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Argument-based teaching: A necessary 21st-century pedagogical practice

Ensino baseado em argumentos: Uma prática pedagógica necessária no século XXI

L'enseignement fondé sur l'argumentation: Une pratique pédagogique nécessaire au 21e siècle

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Abstract

21st-century teachers are required to embrace new, student-centred pedagogical practices that lead to direct student benefits as critical and democratic citizens. One of these pedagogies is argument-based teaching. This theoretical paper provides an overview of argument-based teaching and its main applications and benefits. A relation with 21st-century teaching is established through the concept of critical literacy, a metaliteracy competence promoted by argument-based teaching and learning. After an overview of national and international initiatives, recommendations for teacher education are provided, considering the complexity of argument pedagogical content knowledge.

Keywords: argument-based teaching, critical literacy, 21st century pedagogies

Resumo

Os professores do século XXI são obrigados a adotar novas práticas pedagógicas centradas no/a aluno/a que conduzam a benefícios diretos para os/as alunos/as como cidadãs/os críticos/as e democráticos/as. Uma dessas pedagogias é o ensino baseado em argumentação. Este artigo teórico fornece uma visão geral do que é o ensino baseado em argumentação, bem como as suas principais aplicações e benefícios. É estabelecida uma relação com o ensino do século XXI através do conceito de literacia crítica, uma competência de metaliteracia promovida pelo ensino e aprendizagem baseados na argumentação. Após uma panorâmica das iniciativas nacionais e internacionais, são apresentadas recomendações para a formação de professores, tendo em conta a complexidade do conhecimento do conteúdo pedagógico da argumentação.

Palavras-chave: ensino baseado em argumentação, literacia crítica, pedagogias do século XXI

Résumé

Les enseignants du 21e siècle sont tenus d'adopter de nouvelles pratiques pédagogiques centrées sur l'élève, qui génèrent des avantages directs pour les élèves en tant que citoyens critiques et démocratiques. L'une de ces pédagogies est l'enseignement par argumentation. Cet article théorique donne un aperçu de ce qu'est l'enseignement par argumentation, ainsi que de ses principales applications et avantages. Une relation avec l'enseignement du 21e siècle est établie par le biais du concept d'alphabétisation critique, une compétence en métalittératie promue par l'enseignement et l'apprentissage fondés sur l'argumentation. Après un aperçu des initiatives nationales et internationales, des recommandations pour la formation des enseignants sont formulées, en tenant compte de la complexité de la connaissance du contenu pédagogique de l'argumentation.

Mots-clés: enseignement par argumentation, alphabétisation critique, pédagogies du 21e siècle

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Introduction

The coronavirus disease caused a pandemic crisis not only at the level of healthcare but also in the educational world. The sufficiency of the basic literacy skills and the adequacy of the traditional educational models and patterns crumbled under the challenges of remote learning and online teaching (International Commission on the Futures of Education, 2020). From one day to the other, the world discovered that learning is more complex than educational administrators and curriculum designers believed. Teachers were called to face unexpected human factors normally neglected in education, such as learners' lack of motivation, socio-emotional distance, and cultural isolation. These 21st-century teachers had to embrace new, more student-centred pedagogical practices that educational research designed for decades but were almost ignored in the educational world. They experienced the necessity of rethinking their role (Rapanta et al., 2020), the paths for supporting the students' learning tasks (Rodríguez-Triana et al., 2020), and the image of the learners as active citizens and autonomous social agents (Council of Europe, 2016, 2018). The pandemic simply brought to light the urgent need to develop the competences that learners need in the 21st century, which are transversal (i.e., relevant across many fields), multidimensional (i.e., including knowledge, skills, and attitudes), and associated with higher order skills and behaviours (i.e., allowing learners to cope with complex problems and unpredictable situations; Voogt & Pareja Roblin, 2012).

These "key competences for lifelong learning" (Council of Europe, 2018) hinge on one fundamental and most basic skill – critical thinking or its more applied version known as "critical literacy" (Shor, 1999). Critical thinking is highly ill-defined: while it is one of the key principles for the design of 21st-century learning (Erstad & Voogt, 2018), it is at the same time one of the greatest dilemmas and problems for education (Kaplan, 1994; Radulović & Stančić 2017; Sternberg, 1987). Its problematic nature lies in how it was – and still is – taught, namely as an abstract set of logical skills rather than the active capacity of doing or thinking critically (Mulnix, 2012). To address this deadlock, a performance approach has been developed in education in the last years (Kuhn, 2019; Rapanta, 2019a), in which critical thinking is developed by embedding it in specific practices requiring it. Rather than teaching critical thinking as a subject matter on its own, students are confronted with practices requiring the *use* of this skill. Dialogical argumentation is one of these practices stimulating the development of critical thinking skills.

Dialogical argumentation is a collaborative problem-solving affair that occurs within a dialogic context and can have epistemic outputs for students (Nielsen, 2013). Through engaging in dialogical argumentation, learners can develop (a) their cognitive skills, as they increase their perception and learning of contents with/about which they argue, (b) their metacognitive skills, as they acquire strategies that presuppose a deep understanding of the other's views, such as counterarguing and rebutting, and (c) their epistemological skills, as they acquire knowledge about what is an argument, a counterargument, a rebuttal or evidence (argument content knowledge) and also about how and when to use them effectively (argumentation norms; Kuhn et al., 2013; Rapanta et al., 2013). Moreover, engagement in dialogical argumentation significantly increases the quality and quantity of students' argumentative discourse, mainly arguments, counterarguments, and rebuttals

(e.g., Erduran et al., 2004; Kuhn & Udell, 2003; Zohar & Nemet, 2002). Teachers are the main mediators of this improvement as they allow, listen to, articulate, and encourage students' discourse (Chen et al., 2017).

This theoretical paper has the following inter-connected objectives: (a) to illustrate the relationship between argument-based teaching and 21st-century teaching; (b) to showcase how argument-based teaching has been thus far implemented through international and national (Portugal-based) initiatives; (c) to define the components of teachers' pedagogical content knowledge (PCK) of argumentation; and (d) based on the previous analyses, to provide a list of recommendations for teacher education aiming at the development of 21-st century skills.

Argument-based teaching and 21st-century teaching: the concept of critical literacy

Argument-based teaching is an umbrella concept that includes any type of pedagogical practice rooted in the principles of dialogical argumentation and explicitly aims to develop argumentative discourse and reasoning skills among students (Rapanta, 2019b).

The principles of dialogical argumentation combine (a) the principles of establishing the conditions for having a (good) dialogue in the classroom and (b) the norms of what counts as argument and argumentation. Dialogue principles aim to create a dialogic ethos in the classroom, which is necessary for any type of dialogic pedagogies, including dialogical argumentation. The development of dialogic ethos (Littleton & Mercer, 2013) requires the collective establishment of ground rules for dialogue (e.g., 'all contributions are respected', 'challenges are accepted', etc.; see also Barak & Lefstein, 2022; Mercer et al., 2019) and the creation and maintenance of a safe and positive environment in which all voices are welcome and legitimate (Hennessy et al., 2023; Shi et al., 2023). These dialogue principles are essential for dialogical argumentation to occur so that a constructive dialogue goal (i.e., persuasion, inquiry, negotiation, etc.) is pursued. Failure to establish and fulfil such principles may result in so-called disputational talk (Mercer, 1996) or eristic argumentation (Walton, 2022).

A secondary but equally essential set of principles that define argument-based teaching regards the definition and production of *arguments-as-products* and *arguments-as-processes* (O'Keefe, 1992). Argument-as-products are discursive structures manifesting argument elements such as claims, data, warrants, and backings. These structures are situated within an argument-as-process, which is the concrete goal-oriented dialogical activity in which arguers engage (Nielsen, 2013; O'Keefe, 1992) by making claims, challenging them, backing them up by producing reasons, criticizing those reasons, or rebutting those criticisms (Toulmin et al., 1984). At a structural level, an argument is a potentially controversial claim grounded on some explicit or implicit premises (Walton, 1990). For Toulmin (1958), premises can be of two kinds: the data (or grounds), which support the claim (or conclusion), and the backing that provides support to the logical relationship between the data and the conclusion. The step from the data to the claim is guaranteed by a warrant, which is any generally accepted statement that makes the data relevant to the claim.

Argumentation-as-a-process refers both to the type of dialogue goal pursued by the participants and the socio-emotional and epistemological aspects and skills necessary for engaging in such a dialogue (Rapanta & Felton, 2022). In the literature, seven types of argumentation dialogues have been distinguished according to the participants' predominant goal: persuasion, inquiry, discovery, negotiation, information-seeking, deliberation, and eristic dialogues (Walton, 2022). In educational contexts, information-seeking, inquiry, discovery, and persuasion/deliberation dialogues are highly relevant (Rapanta, 2018; Rapanta & Christodoulou, 2022), but their goals significantly differ (see Table 1). For this reason, teachers need to know when and how to propose one dialogue instead of another. Shifting from one dialogue type to another according to the argumentation goal pursued each time is a necessary orchestrating practice for an argument-oriented teacher (Rapanta & Felton, 2022).

TABLE 1

Types of argumentation dialogue akin to emerge in an educational context

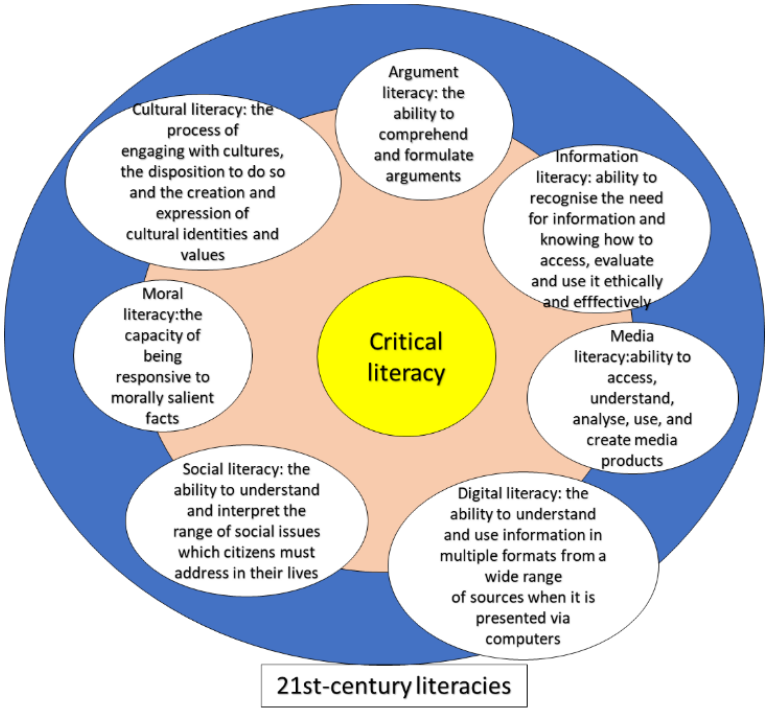
Type	Initial situation	Participants' aims	Dialogue goal
Information seeking	Need for shared knowledge	Check knowledge Share information Build common ground	Make background knowledge explicit
Inquiry	Need to examine evidence	Assess/Interpret/Compare evidence Coordinate evidence with claims	Find the strongest evidence Articulation
Discovery	Need of possible explanations of a problem	(Re-)Define a problem Choose criteria for testing solutions	Find the best hypotheses for testing or analysis
Persuasive deliberation	Need to examine alternative explanations/theories/ solutions	Support explanations with the strongest evidence available	Find the best (most plausible) explanation/theory/solution

Source: Rapanta & Christodoulou, 2022.

All the above imply a set of competences inherent to argument-based teaching and learning, namely: (a) being able to engage in a constructive dialogue with others, including peers; (b) being able to produce valid arguments, i.e., claims supported by valid premises that justify the claim; and (c) being able to engage in dialogical argumentation, i.e., pursuing an argumentation goal such as inquiry, discovery, information-seeking, or persuasive deliberation. The relevance of these competences for 21st-century teaching and learning is justified by promoting the so-called critical literacy. Critical literacy is the practical use and application of critical thinking skills. It is a metaliteracy competence (Mackey & Jacobson, 2011) comprising several higher literacy 21st-century skills related and not limited to: information literacy (Catts & Lau, 2008), digital literacy (Gilster, 1997), media literacy (Lee & So, 2014), argument literacy (Graff, 2003), cultural literacy (Maine et al., 2019), social (Arthur & Davison, 2000) and moral literacy (Herman, 2007). Figure 1 presents a conceptualization of critical literacy as a metaliteracy, combining the several types of literacies mentioned above.

FIGURE 1

Critical literacy as a metaliteracy, central in 21st-century teaching practices



Argument-based teaching promotes the development of critical literacy due to its following characteristics:

- It is *student-centred*: One of the aims of argument-based teaching is to allow students' voices to be heard, legitimizing student ownership of ideas and, subsequently, ownership of the classroom activity, allowing them to manage turn-taking by themselves (González-Howard & McNeill, 2019). In this ultimate state of student-centeredness, the teacher acquires the role of a discussion participant (Kilpelä et al., 2023), who intervenes only when it is absolutely necessary from a managerial (e.g., when the discussion deviates from its goals) or epistemic point of view (e.g., when incorrect ideas are heard – see, for example, Shi et al., 2023, for a Morality and Law teacher intervention, or Felton, Crowell et al., 2022, for a Science teacher intervention). Locating learners in the heart of learning is a primary goal of pedagogies aiming at critical literacy (Beck, 2005).
- It promotes *(inter)active learning*: For the previous to be possible, gradual student participation is required, in terms of learners passing from being passive, to active, to constructive, and finally to interactive. This taxonomy, introduced by Chi (2009), does not imply a hierarchical process but a qualitative difference in terms of actual learning taking place, described as: Interactive > Constructive > Active > Passive (also known as the ICAP framework; see Chi et al., 2018). Argument-based teaching and learning are, by necessity, interactive, as they require a joint commitment to a shared argumentation goal, such as inquiry, persuasion, or deliberation (Rapanta, 2023). It is, therefore, expected that through argumentation learners produce something new together (with or without the teacher, depending on whether the social framing of the dialogue is whole-class or small-group

discussion) and actively participate in their learning process. The more peers interact, the more critical and constructive they become with each other's views (Forman & Ford, 2014).

- It is defined by a *focus on evidence* search and implementation: Argumentation implies (and often requires) the production of arguments, which are logical structures manifested in discourse, comprising an affirmation supported by premises that sustain its truth or plausibility. An important part of such premises aims at justifying the existence of a claim supported by some data through making connections to either personal or scientific evidence, also known as 'backings' (Toulmin, 1958). However, teaching through argument(ation) does not only imply that teachers and students understand and produce evidence-based claims; it goes further to suggest epistemological norms guiding an argumentative discussion, in which for an argument to be stronger or more plausible than another, a stronger piece of evidence is necessary to support it. Whether the argumentative discussion is framed as a "win-lose" (persuasive) or a "win-win" (deliberative) situation, the norm guiding the discussion is the same: the stronger the evidence, the better the argument. Teaching, therefore, students about what counts as evidence, the difference between facts and opinions, and the different epistemic strengths of various information sources is highly related to argument-based teaching. If this critical evaluative stance towards information is achieved, other types of literacy are promoted together with argument literacy, such as digital, media, and information literacy.
- It is directly linked to *democratic citizenship and deliberation*: as Schwarz (2009) explains, "democratic citizenship, is in itself of argumentative nature" as any type of civic engagement and commitment to democratic processes demands from citizens "to know to express opinions (e.g., in petitions), to participate to debates, to bargain, or to make compromises" (p. 120). Consequently, several studies aiming at educating democratic citizens have used argumentation as their primary means (e.g., Kuhn et al., 2019; Schuitema et al., 2018). Recent theoretical research also links dialogical argumentation to processes of cultural literacy understood as a core competence within a citizenship-in-the-making approach rooted in dispositions such as tolerance, empathy, and inclusion (Rapanta et al., 2021). Critical-analytical discussions have, indeed, an impact on young learners' sociomoral reasoning, which lies in the heart of deliberation, as recent studies show (Baker et al., 2023; Gasser et al., 2022).

It can be further said that due to the strong relationship with critical literacy, as explained above, argument-based teaching is a promotor of active and responsible citizenship, a key requirement for 21st century. In fact, recent studies confirm that active citizenship, understood as an institutionally driven process favouring top-down and bottom-up participatory approaches (Bee, 2017), relates to practices of deliberative argumentation, manifesting the capacity to deeply understand and engage with others' points of view, even when they are opposing to one's own, and to co-create an integrated approach to common thinking and action (Larrain et al., 2021; Universidade Nova de Lisboa & University of Nicosia - Cyprus, 2023).

Evidence from International and National Projects

Dialogical argumentation has been the focus of innovative pedagogical interventions both as a tool for learning specific curricular content (known as the arguing-to-learn approach) and as a method for enhancing critical thinking and argumentative reasoning skills, without a learning content component (known as the learning-to-argue approach; Mirza & Perret-Clermont, 2009). Although the majority of studies focus either on one goal (curricular) or the other (non-curricular), recent research has shown how the two goals are compatible (e.g., Rapanta, 2021; Walker & Sampson, 2013) and often depend on each other (Iordanou et al., 2019). This is particularly the case when argument-based practices are promoted by ordinary teachers and not by researchers: in everyday pedagogical practice, curricular and argument-related goals intermingle, mainly because teachers need to fulfil a concrete curriculum without many deviations for "just" focusing on critical literacy development (although the latter would be much welcome and necessary). Below is a representative summary of international and national (Portugal-based) argument-based teaching initiatives implemented by the teachers, not by researchers, as part of teacher professional development programmes.

International initiatives

Several international initiatives have been on argument-based teaching as part of science teacher educational programmes and their respective implementation. This is because of the strong relationship between science and argumentation, both aiming at evidence-based explanations of certain phenomena (Osborne, 2010). Some of the initiatives propose a structured lesson programme with concrete topics to be applied by the teachers in their respective classrooms (e.g., Howe et al., 2015; Larrain et al., 2019), while others focus on the use of argumentative language and activities by the teachers in their everyday practice (e.g., González-Howard & McNeill, 2019; Henderson et al., 2021; McNeill et al., 2016). Either in one way or another, evidence suggests that argument-based teaching in science has a significant impact on students' construction of both oral and written arguments (e.g., Chen et al., 2016), their development of more advanced argumentation reasoning structures such as counterarguments and rebuttals (e.g., Erduran et al., 2004), and the transformation of the classroom into a community of inquiry (e.g., Duschl & Osborne, 2002).

There has also been a significant number of studies on argument-based teaching in history, focusing on the analysis and interpretation of various historical sources, both primary and secondary (e.g., De La Paz & Felton, 2010), the comparison of different perspectives on the same event (e.g., Nokes & De La Paz, 2023), and the construction, evaluation and revision of historical arguments (e.g., Herrenkohl & Cornelius, 2013). Evidence from the above-cited studies suggests that argument-based teaching significantly impacts students' writing of elaborated essays with historical accuracy and persuasiveness, their participation in sophisticated discussions of epistemic issues that resemble the ones by historians, and their subsequent engagement in civic participation.

Regarding language arts, argument-based teaching also has an important place. A method called Collaborative Reasoning (Anderson et al., 1998) is an example. As part of the method, students (usually elementary and low secondary school) openly discuss a "big question" related to a story they read, and they gradually manage turn-taking without the teacher's participation. Extensive evidence suggests that, after systematic participation in Collaborative Reasoning discussions, students manifest gains in their argumentative writing (Reznitskaya et al., 2001), and the quality of their written arguments is similar to the quality of the oral arguments during the discussions, implying a possible transfer from one setting to another (i.e., from oral to written; Reznitskaya et al., 2009). Another method is the so-called Dialogic Literary Argumentation (DLA), which implies engaging students and teachers in

> reading, dialogue, and argumentative writing about how they and others make meaning out of literary texts, what the meaning says about what it means to be human together, and how we might act in and on the worlds in which we live. (VanDerHeide et al., 2023, p. 417)

Evidence suggests that implementation of DLA helps teachers gradually adopt a more dialogic stance, allowing students to be genuinely interested in how their ideas relate to the ones of others, and develops students' "arguing-as-conversation" (VanDerHeide & Juzwik, 2018), facilitating their disciplinary engagement[1].

National initiatives

In Portugal, few teacher professional development (TPD) initiatives have been aimed at argument-based teaching. However, the few observed noted a significant impact on teachers and students. For instance, the work conducted by Cecília Galvão, Pedro Reis and their colleagues during the last two decades is well known. Although not directly focusing on the promotion of students' argumentative reasoning, as in the case of argument-based teaching, the research described by Galvão et al. (2011) and Reis and Galvão (2004), among other works, sheds an explicit focus on the potentialities and challenges of critical discussions around scientific and socio-scientific issues. A recent focus on active environmental citizenship (Reis, 2020) makes the connection between critical and environmental literacy even more explicit. Among the challenges raised by Portuguese teachers involved in professional development around active citizenship (Reis, 2014), there are mentioned time restrictions, students' lack of commitment, and difficulty of some students to adapt to student-centered teaching, requiring their active participation. It seems that more concrete training on argumentation among pre-service and in-service teachers may overcome the difficulties regarding students' engagement in dialogic participation, especially regarding the selection of controversial issues that may motivate students, as further discussed in the next section.

Recently, the author carried out two research initiatives in Portugal explicitly aiming at argument-based teaching and its use for improving students' critical literacy. The first one, carried from 2016 until 2018 as

[1] For more reading-based argumentation methods see an overview by Wilkinson et al. (2015).

part of the IMPACT (Improving Pedagogies through Argument-based Classroom Teaching) Project, was an exploratory study on how middle-grade teachers' everyday language and activity can be transformed into a dialogue-based argumentative experience (Rapanta, 2019b). Unlike most argument-based TPD programmes, this initiative did not create any specific curriculum or lesson plans for teachers to implement. The main goal of the TPD was to introduce teachers from different disciplines into the principles and structures of argumentative reasoning and dialogue and to prepare them as designers of argument-based learning environments, through giving them the theoretical and practical tools to design their own whole-class or small-group discussion activities. Teachers' reflections at the end of the TPD show their gradual appropriation of classroom argumentation knowledge, as guided by the Argumentation Rating Tool (Reznitskaya & Wilkinson, 2021), consisting of eleven ways of how teachers' and students' argumentative reasoning may be manifested in classroom discussions.

The second initiative (Rapanta, 2021) was an adaptation of the famous "Argue with me" *curriculum* created by Deanna Kuhn and colleagues (2016) and implemented in various countries worldwide, such as the USA, China, Brazil, and Cyprus (Iordanou & Rapanta, 2021). For the first time in Portugal, the program was adapted to the middle-school curricula, working closely with Science, History, Language Arts, and Citizenship Education teachers. After participating in a 12-hour professional development, four teachers were asked to volunteer for a quasi-experimental study, teaching two classes each, one following the adapted "Argue with me" curriculum and the other following the as-usual teaching. The effect of the argument-based teaching intervention on the students was assessed by pre/post-individual written essays, coded in terms of their use of argumentative reasoning structures. The analysis showed a significant increase in argumentative reasoning skills, as manifested in student essays, for the experimental group students only. The intervention's impact on teachers was also studied through semi-structured interviews. The analysis of the teacher interviews revealed a significant change in the way teachers perceived their role in the classroom, less as an authority and more as a coach, as well as several perceived gains in their students' behaviour including socio-emotional benefits.

Towards a definition of argument pedagogical content knowledge

Because of the demonstrated benefits of argument-based teaching practices, as explained above, defining the components of teachers' PCK of argumentation has received much attention in recent studies. The traditional definition of general PCK by Shulman (1986) refers to "the most useful forms of [content] representation (…), the most powerful analogies, illustrations, examples, explanations, and demonstrations – in a word, the ways of representing and formulating the subject that makes it comprehensible for others" (p. 9). In the dialogue-based practice of argumentation, PCK refers to the theoretical and practical knowledge that helps teachers integrate argumentation into classroom practice (McNeill & Knight, 2013). Although PCK of argumentation has been studied extensively in science teaching (McNeill et al., 2016), its generic definition and study are still underdeveloped. What I will attempt in this section is to provide some

general guidance regarding the design of argument-based learning environments based on my own and others' work as teacher educators.

Choosing an issue

Choosing an appropriate issue for student argumentation is a problem encountered in all disciplines (Rapanta, 2019b). In argumentation theory, an issue usually refers to an unsolved problem or an unproven hypothesis (Walton, 1990). In educational terms, an issue may be translated into the "big" triggering question for argumentation. In this sense, an argumentative issue can be of the following types:

1) A dichotomous issue, meaning one that invites a Yes/No answer with available evidence for each side of the coin. This type of issues is adequate for persuasion and deliberative dialogues (Note that a dichotomous issue may also be replied by a third-type of answer, such as "I am in favour, but only under certain conditions", as noted by Galvão et al., 2011).
2) A comparative issue, meaning one that invites a careful search and comparison, but not necessarily an analytical interpretation, between different sources of information to form claims and hypotheses about certain facts. This type of issues is adequate for information-seeking and discovery dialogues.
3) An analytical issue, meaning one that requires a careful interpretation and analysis between different types of sources or "sides of the story" to arrive at the most plausible position possible. This type of issues is adequate for inquiry dialogues.

Regarding argument-based teaching, issues can also be distinguished between real (meaning not resolved) and made-up issues (meaning issues to which there is a known answer but the teacher frames it as an ill-defined problem). Real issues usually are of a general or socioscientific nature, whereas made-up issues can relate to any disciplinary field. Examples of real, ill-defined issues can be found in Kuhn (2018; e.g., animal testing, abortion, space waste, etc.). For made-up issues, some knowledge camouflaging process is necessary (Rapanta, 2019b). Examples in Table 2 from Physics and History illustrate what this may mean in different disciplinary contexts.

TABLE 2

Examples of made-up issues in Physics and History

Physics	History
Why do objects fall on Earth and fly on other planets? *(we 'pretend' we do not know how the gravity law works)*	During the Cold War, there were alternately conflict phases and calming stages *(a discussion point drawing on the vagueness of the statement)*
How come a magnet is stronger than Earth? *(we 'pretend' we do not know the relation between magnetism and gravity)*	The revolution of 25th April 1974 established a democratic regime and proposed a solution for the Colonial War, which essentially resulted in conceding Portuguese citizenship to the colonies' native population *(a discussion point drawing on partially correct information)*

Source: Rapanta (2019b).

A difficulty when it comes to identifying an issue relates to teachers' general preference for explication (information-seeking) rather than explanation (inquiry) questions (Benedict-Chambers et al., 2017). Although the former is highly common in classroom discourse, only the latter may trigger an argumentative discussion if successfully framed (Rapanta, 2019b). Table 3 shows how the same topic may be approached through an explanatory rather than an explicatory mode and, therefore, be transformed into an argumentative issue.

TABLE 3

Transformation of explication into explanation questions

Explication questions	Explanation questions
What types of volcano eruptions exist, and what is their difference?	Why did flashes come out with the eruption of the volcano Sakurajima?
What were the principal goals of the Society of Nations created in 1919?	Europe fell into a serious economic crisis until 1925. Why did the Society of Nations not achieve to fulfil its goals?

Source: Rapanta (2019b).

Orchestrating a whole-class argumentative discussion

Orchestrating a whole-class discussion may be challenging from different points of view, especially when it concerns attending various students' viewpoints, mediating different contributions, and identifying argument elements emerging in students' discourse (Sedova et al., 2016; Wilkinson et al., 2017). However, theoretical and empirical insights can help teachers achieve this. From a theoretical point of view, there is evidence, also verified by applied research (see, for example, Rapanta & Christodoulou, 2022), that shifting between different types of argumentation dialogue (Walton, 2022) is important for teachers' orchestration of argumentation. This implies that teachers are aware of the different goals argumentation can pursue, ranging from simple information-seeking to more sophisticated goals such as inquiry (Reznitskaya & Wilkinson, 2017) and deliberation (Felton, Levin et al., 2022). Pursuing one type of dialogue rather than another implies different sociocognitive processes, as previously described in Table 1.

From an empirical point of view, research highlights the importance of responsive teaching (Richards & Robertson, 2016), which implies a shift of focus from teachers' thinking to attending to the substance of students' ideas, recognizing important disciplinary connections within those ideas, and taking up and pursuing those ideas (Dunning, 2023). In particular, when it comes to argumentative discussions, teacher responsiveness is further translated into shifting from a facilitating thinking stance to eliciting critical thinking when necessary (Felton, Crowell et al., 2022). Finally, the research also mentions specific techniques that may facilitate whole-class argumentative discussions. An example is the two-semi-circle group format, in which students are invited to sit in either an inner semi-circle in the centre or in an outer semi-circle. Taking turns, only the students in the inner circle are allowed to talk, with the ones outside observing the discussion and preparing to intervene afterwards (González-Howard & McNeill, 2019). Another technique is using whole-class discussions after small-group discussions, with one representative of each group presenting the results of the small-group discussion to the bigger group, also known as "teacher-orchestrated post-group plenaries" (Howe, 2023, p. 35).

Designing a small-group argumentative activity

Orchestration of dialogical argumentation is also highly relevant for small-group discussions. In that context, the role of the teacher is more of an instructional designer who needs to take care of all aspects for the argumentative activity to be feasible and successful. Some of these aspects are (Rapanta, 2019b): theme (referring to the concrete issue to be discussed and its relation to the curricular topics), structure (including the sub-activities and timing of each), objectives (referring to both cognitive-epistemic and social-emotional objectives), strategies and techniques (including materials used to support argumentation). Giving small groups a physical element or visual representation (e.g., a board, a template, etc.) to be used as a mediating object of their socio-cognitive activity of arguing has been proven efficient in various contexts. Moreover, timing the different micro-activities forming part of the same macro-activity and marking the time in a joyful manner (for example, through squeezing a soft animal toy that makes noise) has been proven highly efficient and motivating, based on the author's own experience, especially with loud classes.

Prompting students' argumentation

As part of whole-class or small-group discussions, the teacher's role in prompting and/or mediating students' argumentation is central. Several studies have identified concrete ways, or dialogue moves, that a teacher can use to prompt critical thinking and argumentation during a discussion. For example, Dawson and Venville (2010), building on Simon et al. (2006), list the following argument-based teaching moves: knowing the meaning of argument, positioning, justifying with evidence, constructing arguments, evaluating arguments, counterarguing, and reflecting on argument process. Other studies (e.g., Gillies & Khan, 2009; Jin & Kim, 2021) emphasise the role of metacognitive questioning techniques to model students' thinking and help them understand the importance and nature of evidence-based argumentation.

Evaluating students' oral and written performance

One aspect that has received researchers' attention is how student-generated arguments and argumentation may be assessed so that argument-based teaching can be used for formative assessment. Most research has focused on methods to assess students' written argumentation, usually in essays or letters with an argumentative purpose. The most frequently used or adapted instruments for school students are (see also Macagno & Rapanta, 2019 for an overview): Toulmin's (1958)Argument Pattern, looking at the presence of argument elements such as claims, data, warrants, backings, rebuttals, and qualifiers; and Kuhn et al.'s (2016) coding scheme identifying statements that 'support own', 'support other', 'weaken own', 'weaken other' as well as the so-called 'however' structures that combine an evidence-based support of

one's position with a recognition of a strength in a contrary position or a weakness in one's own, followed by an additional evidence to support one's argument (what would correspond to an integrated argument; see also Nussbaum, 2021).

What is more challenging, though, is the assessment of student oral discourse as part of an argumentative discussion. There are two possibilities in that case: (a) recording and transcription of the classroom-based discourse and *a posteriori* analysis of the same with a particular focus on one or more aspects of arguments-as-products and/or arguments-as-processes (see, for example, Erduran et al. [2004] study using Toulmin's [1958] Argument Pattern to identify levels in students' argumentative reasoning at a classroom level; or Macagno et al. [2022] study using a validated coding scheme specifically designed to grasp students' level of dialogicity, with arguments being considered highly dialogical discourse moves as compared to other, low-dialogical moves); and (b) assessment of the ongoing student discourse done directly by the teacher. In that latter case, instead of focusing on the quality of individual arguments, which would have been impossible from a classroom management perspective, the teacher is invited to assess the overall classroom climate in terms of several factors, including student participation, spontaneous reaction to each other comments without the teacher's intervention, use of more sophisticated types of discourse such as evidence-based affirmations, use of counterarguments and rebuttals from part of the students, etc. An example of this type of teacher-based assessment is described by Henderson et al. (2021).

Recommendations for teacher education

Based on the above overview of the importance and current state of argument-based teaching as a 21-st century pedagogical practice and the definition of argument PCK and its main components, I will now provide a list of evidence-driven recommendations regarding teacher education aiming to promote critical literacy:

1. In face of the challenges and uncertainty that opening up the space of dialogue/debate for students may have, most teachers opt for an authoritative discourse mode, securing interpretive authority just for themselves and not allowing students' epistemic agency to emerge (Hennessy & Davies, 2019). To deal with this, TPD may focus on at least two goals: first, help teachers gain awareness of their own communicative style, e.g., among the ones suggested by Scott et al. (2006), as it is common that teachers think that they are dialogic teachers while their approach is an interactive-authoritative one; second, provide them with knowledge of different types of dialogues they can implement and types of questions-prompts they can use to elicit different learning objectives.
2. Implementing argument-based teaching requires a fundamental pedagogical and epistemological shift from part of the teachers (Zohar, 2008). Therefore, argument-oriented TPD must take time and provide space for coaching and/or reflection to assist teachers in the difficult task of designing learning environments that promote argumentative reasoning (Jiménez-Aleixandre et al., 2010). As

explained previously, argument PCK is a complex construct that includes strategies of issue selection, discussion orchestration, activities' design, and arguments' evaluation. For teachers to be able to acquire and implement this knowledge, they must first see themselves as learning designers and promoters of critical thinking, then act as facilitators, and ultimately intervene in the discussions when serious epistemic errors in their field are committed. Adopting this triple role of critical thinker-facilitator-scientist (Rapanta, 2017) is crucial for argument-based teaching to be effective.

3. Using and designing resources and materials to prompt critical thinking and argumentation is fundamental. As 21st-learners are digital readers, multimodal texts are proven efficient triggers for productive discussions (Serafini, 2012) – see, for example, the multimodal library provided as part of the DIALLS European Project[2]. It is also recommended that small-group discussion activities have a visual structure to guide students in constructing and sharing their arguments and conclusions. Such structures include argument maps, discussion templates, evidence sheets, etc.

Overall, argument-based teaching is an innovative, student-centered pedagogical method focusing on students' participation in argumentative discussions as part of whole-class or small-group activities. It is strongly linked to 21st-century skills and competences because of its connection to the so-called critical literacy, a metaliteracy competence lying in the heart of what it means to be a democratic citizen in the era of fake news and alternative facts. With its explicit focus on the search, analysis and use of evidence, argument-based teaching is a promising direction for student-centred pedagogies to empower learners as critical and autonomous knowledge consumers and constructors. However, for its efficient implementation, teachers must acquire the so-called argument PCK necessary for the understanding, designing and implementing whole-class and small-group dialogical activities. Pre-service and in-service TPD initiatives with an explicit focus on argumentation are urgently needed, also given the significant positive impact of dialogical argumentation on students and teachers alike.

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