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Argumentation and Knowledge Construction in Higher Education: A Vygotskian Perspective

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Abstract

Empirical research indicates that the utilization of argumentation as an educational strategy fosters the acquisition of argumentation skills and disciplinary knowledge. Furthermore, there is evidence to show that argumentation skills development mediates the effect of oral argumentation on disciplinary knowledge. However, studies have also shown that argumentation is scarce in higher education and that although lecturers see argumentation as a relevant pedagogical goal, they think that students need to first acquire knowledge in order to develop argumentation skills. Therefore, a crucial pedagogical resource to promote scientific knowledge in higher education is being overlooked. This paper is aimed at shedding light onto argumentation as a key practice in higher education teaching, disputing the idea that to argue, students first need to acquire knowledge. We elaborate further on Vygotsky's notion of scientific concepts, highlighting their dialectic structure, which accounts for the epistemic potential of argumentation. This paper extends an invitation to higher education lecturers to prompt argumentation in classrooms as a form of disciplinary learning. Limitations and implications are discussed throughout the paper.

Keywords: argumentation, scientific concepts, knowledge, higher education teaching

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Argumentación y Construcción de Conocimiento en Alumnos de Educación Superior: una Perspectiva Vygotskiana

Resumen

La investigación empírica indica que el uso de la argumentación como estrategia educativa fomenta la adquisición de habilidades de argumentación y conocimientos disciplinarios. Además, hay evidencia que muestra que el desarrollo de habilidades de argumentación ayuda a mejorar la argumentación oral de los alumnos en torno al conocimiento disciplinario. Sin embargo, varios estudios también han demostrado que la argumentación es escasa en la educación superior y que, aunque los profesores ven la argumentación como un objetivo pedagógico relevante, piensan que los estudiantes primero necesitan adquirir conocimientos para poder desarrollar habilidades argumentativas. Debido a esto, se está desaprovechando un recurso pedagógico crucial capaz de promover el conocimiento científico en la educación superior. Este artículo tiene como objetivo destacar la argumentación como una práctica clave en la enseñanza de la educación superior, disputando la idea de que, para argumentar, los estudiantes primero necesitan adquirir conocimientos. La investigación también profundiza en la perspectiva de Vygotsky sobre los conceptos científicos, subrayando su estructura dialéctica, la cual explica el potencial epistémico de la argumentación. Asimismo, este artículo extiende una invitación a los profesores de educación superior a fomentar la argumentación en las aulas como una forma de aprendizaje disciplinario. Las limitaciones e implicaciones se discuten a lo largo del artículo.

Palabras clave: argumentación, conceptos científicos, conocimiento, enseñanza en la educación superior

Argumentação e Construção do Conhecimento em Estudantes do Ensino Superior: uma Perspectiva Vygotskiana

Resumo

Pesquisas empíricas apontam que o uso da argumentação como estratégia pedagógica favorece tanto o desenvolvimento de habilidades argumentativas quanto a aquisição de conhecimento em diferentes áreas disciplinares. Além disso, há evidências de que essa prática melhora a argumentação oral dos estudantes ao tratar de temas científicos. Entretanto, diversas pesquisas revelam que a argumentação é pouco explorada no ensino superior. Embora os docentes reconheçam sua importância como objetivo pedagógico, muitos acreditam que os alunos devem primeiro dominar o conteúdo antes de desenvolverem suas competências argumentativas. Essa abordagem resulta na subutilização de um recurso pedagógico valioso, capaz de impulsionar a construção do conhecimento científico. Este artigo visa destacar a argumentação como prática essencial no ensino superior, desafiando a ideia de que o domínio prévio de conteúdos seja um requisito para o desenvolvimento da argumentação. A pesquisa também explora a perspectiva de Vygotsky sobre os conceitos científicos, enfatizando sua natureza dialética e o potencial epistêmico da argumentação. Ademais, o artigo convida os docentes incorporarem a argumentação em suas práticas de ensino como meio de promover a aprendizagem disciplinar. As limitações e implicações dessa abordagem são discutidas ao longo do texto.

Palavras-chave: argumentação, conceitos científicos, conhecimento, ensino superior

Introduction

The central task of university education is to train professionals, which is a major challenge. Part of this challenge is for students to reconstruct their own knowledge of their disciplines and professions in order to share their ways of thinking and to conceive the world in which we live from these perspectives. Obviously, achieving this goal is a complex matter, especially in the current reality of the highly overcrowded and diverse university system (Mok & Marginson, 2021).

The massification and diversification of the university system have led to greater access to higher education by the population and, although coverage is still insufficient (as students of low socioeconomic status have less opportunity to study in higher education) (Vandelannote & Demanet, 2021), there has been progress in this regard, particularly in countries where the state's support and sources of financing have increased. This has generated a change in the entry profile of students by allowing access to a group of students that was previously excluded. In countries where the educational system is highly segregated, and the socioeconomic group of origin is intimately linked to the quality of the education to which they have access (Gutiérrez & Carrasco, 2021), this massification of the university system translates into very unequal entry characteristics, both in skills and previous knowledge.

Thus, although there is greater access to the university education system, the diversification of the entry profile has also evidenced a series of disadvantages with which these students deal, impacting on the permanence and effective term of the chosen career (Ives & Castillo-Montoya, 2020). Faced with this situation, the university has the formative challenge of ensuring that all students, regardless of their previous training, reconstruct the specialized knowledge of their disciplines and professions.

In this regard, the evidence indicates that argumentation constitutes a pedagogical practice especially powerful that enhances learning and the construction of knowledge (Driver et al., 2000; Jiménez-Aleixandre & Erduran, 2008). Specifically, empirical studies show that argumentative practice is crucial for the development of an argumentative ability, both at basic school levels (Bulgren et al., 2014) as well as at high education levels (Fan et al., 2020) as it promotes learning and knowledge acquisition (Iordanou et al., 2019). Furthermore, empirical studies indicate a correlation between the practice of argumentation, the enhancement of individual argumentative abilities, and the advancement of knowledge among school-aged children (Larrain et al., 2020; Vogel et al., 2017). This implies that these skills may serve as a mediating factor when using argumentation as a tool for the development of scientific understanding.

Nevertheless, two challenges persist. Firstly, while university students possess foundational argumentation skills (Larrain et al., 2015), the impact of university education on the enhancement of these skills is minimal, often reinforcing pre-existing disparities. Consequently, if argumentative skills, which are crucial for knowledge formation, remain underdeveloped during university education, it would lead to inequity among students in acquiring this essential cognitive tool for knowledge construction. Secondly, the absence of argumentative practice within the university setting, which is essential for fostering knowledge and skill development

to bridge entry-level disparities, is notable (Archila et al., 2020). Additionally, a study in Chile revealed that educators in fields like Law and Philosophy view argumentation as a pedagogical tool primarily for skill enhancement rather than knowledge acquisition, mistakenly believing that disciplinary knowledge is necessary for teaching argumentation (Larrain et al., 2021). This perspective overlooks the potential of university education to cultivate both knowledge and critical skills, such as argumentation

The absence of reflection on argumentation and its role in knowledge construction within higher education literature, despite its recognition in Piaget's work, may be attributed to a prevailing transversal conception within the academia. This conception often views argumentation more as a linguistic-cognitive process rather than a means of thinking and constructing knowledge1. This article aims to contribute to the discourse on teaching in higher education by exploring the epistemic nature of argumentation, which is crucial for fostering not only knowledge but also essential skills such as argumentative skills

Development of argumentative skills in Higher Education: A question of fairness

Research indicates that university students often exhibit limited argumentative abilities, particularly in written form (Larrain et al., 2015). Despite the recognized importance of argumentation in the learning process across various disciplines (Fan et al., 2020; Si et al., 2019), the university system frequently fails to teach argumentation explicitly or systematically (Larrain et al., 2021; Quintana & Correnti, 2019). This lack of emphasis on argumentation as a transversal skill may contribute to the underdevelopment of students' argumentative skills, which are essential for constructing knowledge and engaging in critical thinking.

Although arguing is not taught, argumentation is a skill that is evaluated in higher education (Andrews et al., 2006), which ultimately impacts the student's development. This is problematic because it implies that university assessment not only rests on the learning that is actually taught but on competencies and skills that are acquired and that are unequally distributed in students, contributing to the reproduction of existing social structures: students with greater cultural capital will be more qualified to deploy the argumentative language skills required in evaluative situations than those who have not previously developed this skill. In the current university system, facing this problem is an ethical duty associated with the principle of justice in higher education.

In this regard, we could assume that a logical way to address the problem would be to teach students to argue in order to develop the linguistic skills – diverse and unequal – that students bring as characteristics of entry into the university system. The problem we face is not only that opportunities for teaching argumentative skills are scarce, but that there is a debate about what space is most effective to develop this skill (intra or extracurricular) and how to do it (implicitly or explicitly). On the latter, there is some evidence that suggests that explicit teaching of argumentation would be more effective than implicit (Tiruneh et al., 2014). However, the explicit teaching of argumentation in courses or workshops specially designed for it, either within or complementary to the curriculum, despite allowing the promotion of

general argumentation skills, does not promote the learning of the discursive genre typical of disciplinary argumentation (Larrain & Burrows, 2020). An alternative is to promote argumentation skills to learn the discipline through the sustained and transversal practice of argumentation as a means of disciplinary learning.

Argumentation in the classroom as a teaching and learning strategy of the disciplines

Argumentation, as a socio-discursive practice in which one or more speakers deal with a controversial issue through the formulation of arguments and counterarguments, articulating theory and evidence (Archila et al., 2020) to reach an understanding, has traditionally been conceived as closely linked to thought (Billig, 1996; Kuhn, 2010) and the construction of knowledge (Leitão, 2000; Schwarz, 2009). The epistemic nature of argumentation is indeed recognized for its role in enhancing scientific competencies such as reasoning, critical thinking, and scientific thinking (Hasnunidah et al., 2020; Sönmez et al., 2021; Osborne, 2010; Bulgren et al., 2014). In fact, research consistently shows that argumentative practice positively impacts disciplinary learning, helping students to better structure their reasoning, consider alternative viewpoints, and develop a deeper understanding of the subject matter (Nnanyereugo & Bolaji, 2020; Asterhan & Schwarz, 2016).

Research with schoolchildren supports this notion, indicating that peer-to-peer argumentation, particularly the articulation of counterarguments, fosters conceptual development (Larrain et al., 2019). Additionally, studies demonstrate that engaging in argumentative discourse within the classroom to acquire disciplinary content enhances both disciplinary learning and general argumentation skills in children (Iordanou et al., 2019). Furthermore, it is suggested that general argumentation skills serve as a mediator in the influence of argumentative practice on knowledge construction (Larrain et al., 2020).

Arguing in the classroom indirectly fosters knowledge by enhancing individual argumentation skills, which contribute to the social construction of knowledge. At the university level, research has shown that argumentative practice positively affects both argumentation skills and knowledge progression (Antonio & Prudente, 2021; Mulyati & Hadianto, 2022). However, these studies have not explored the mediating role of argumentation skills in knowledge construction, a phenomenon previously observed in schoolchildren. While the evidence on the mediating role of argumentation does not directly address university contexts, it is essential to consider potential differences that warrant investigation. The dual benefit of argumentation practice is significant, as it enhances the construction of disciplinary knowledge through the development of individual argumentation skills. These skills are cultivated through social interactions and argumentative experiences related to disciplinary content within the classroom setting.

Studies indicate that argumentative practice is notably lacking in the university setting, particularly within scientific education (Archila et al., 2020; Pabuccu & Erduran, 2017). It is observed that educators often favor traditional teaching methods, which typically involve minimal student interaction (Børte et al., 2020). Consequently, this approach may result

in missed opportunities to enhance disciplinary knowledge among students, potentially exacerbating disparities in entry-level competencies. Furthermore, from an epistemological point of view, the absence of systematic argumentative practice in student education may lead to a perception of scientific and disciplinary knowledge as a mere accumulation of static and unquestionable facts (Driver et al., 2000). This perspective undermines the educational objective of preparing professionals who recognize the provisional nature of knowledge (Kuhn, 1962) and appreciate the significance of its critical assessment.

The conceptions of argumentation in university education

The question arises as to why argumentation, a recognized pedagogical strategy in school education, is not similarly emphasized in higher education discourse. A potential explanation is the nascent stage of pedagogical reflection in higher education, which grapples with the challenges of disciplinary diversity and a lack of professional training among lecturers for such strategies (Daniels, 2017; Daumiller et al., 2020; Fraser et al., 2019; Ndebele, 2022). Since argumentation still remains an underexplored and poorly communicated concept, it is not recognized as a learning discipline. Instead, the broader concept of active learning strategies serves as an umbrella term that includes various teaching methods, including argumentation.

Larrain et al. (2021) show that even in careers where argumentation should be a focus of reflection both as an objective and as a means of learning, the former is found but not the latter. For example, in the teaching of Philosophy and Law, the practice of argumentation is mainly conceived as a way to develop argumentation skills, recognized as relevant to professional practice, once students have the necessary knowledge. A conception of argumentation as a means of disciplinary learning is missed. These beliefs and conceptions would not only be the basis of the pedagogical choices of lecturers but also, above all, of curricular designs that would not visualize the potential of arguing in the classroom to build knowledge of the disciplines.

The classical theoretical explanations of argumentative discourse derived from the theory of argumentation have focused on its linguistic character (Domínguez & Conforti, 2019). Generally speaking, according to Buitrago et al. (2013), from scientific language and discursive approaches, argumentation can be understood as a competence or cognitive-linguistic skill derived from cognitive skills.

If argumentation is theorized as a linguistic product derived from cognitive skills, in that order (Buitrago et al., 2013), then it is understandable that, for example, extracurricular institutionalized spaces focus on the latter and not on teaching and giving opportunities to develop argumentation practice. The same argument is valid for teaching strategies: the focus is on developing in some way cognitive skills (such as understanding, applying, etc) among the students. While this happens, it is assumed that the student can express and communicate linguistically that knowledge mentally represented and developed from the lecturer's discourse in the classroom.

If argumentation is thus distinguished and conceptualized as an argumentation product – without influence or relevant link with the thought process – even if such a distinction may be useful in analytical terms, it hides the processual and dialogical nature of argumentative practice

(Larrain et al., 2019) and ignores the discursive and dialectical character of the construction of scientific knowledge. Moreover, it hinders the recognition of the interrelationship between these concepts and the transformative potential of argumentative practice for developing scientific knowledge.

In this way, this article aims to contribute to raising an epistemic notion of argumentation that highlights its socio-cultural nature and its intimate role in the construction of disciplinary knowledge. To do so, we will raise a notion of disciplinary knowledge from Vygotsky's (1986) theory of concept formation. From this notion, we raise a proposal of argumentation as a process of generalization of tensions, which allows us to reconstruct the relational nature of disciplinary knowledge.

Argumentative language and conceptual development: Argumentation as a process of generalization

Language and theory of concepts in Vygotsky

For Vygotsky (1986), every concept is a generalization, that is, "operations in which a particular and unique event is treated as a class of events" (Larrain, 2017, p. 3). However, while every meaning of the word is a generalization, not every meaning of the word is a concept or, at least, not a developed concept. For Vygotsky (1986), concepts, as forms of generalization, are developed; that is, concepts and words do not coincide at all because a word can imply very different ways of conceptualizing. The concepts are not given by the processes of maturation of the human being or emerge only by the action of this on the objects. It is the communicative social environment, pre-existing to the individual, which demands the use of language and, with it, the development of those concepts. Thus, concepts are not categories for labeling or classifying meanings represented in the mind. Rather they are processes of generalization that occur moment by moment in the use of language and from communicative social interaction.

The fact that the concept is developed in and by the means of social interaction does not mean that it is knowledge that is "outside" and that it is "transferred" directly by other people. On the contrary, once the individual discovers the word already created and functional in the socio-historical environment, they only begin to create the forms of generalization that these forms of language suppose, and they do so through its use in different communicative contexts and given the needs of social activity. Thus, two people may even use the same words, but that does not imply that they think generally in the same way.

In Chapter 5 of "Thought and Language," Vygotsky outlines a complex and lengthy developmental sequence for concept formation. This process begins with children's initial utterances, which are syncretic generalizations marked by a heavy reliance on perception and considerable instability, making them unconventional. Over time, this progresses towards more conventional generalizations, where abstraction and generalization merge. In Chapter 6 of "Thought and Language," Vygotsky distinguishes between two types of concepts: everyday or complex concepts and scientific concepts. Everyday concepts, which are initially unstable and encompass diverse generalization methods ranging from highly perceptual to more stable

and pragmatic, are acquired through unsystematic interactions. These interactions are crucial as they often reference the specific context of the child's activities, facilitating the learning process. In this way, everyday concepts are rich in terms of concrete experiences, are a-conscious, and are not related to each other.

From instruction, that is, from a type of systematic, repetitive, and deliberate social interaction, a qualitatively different form of generalization arises, that is, the emergence of scientific concepts or, in the words of Vygotsky (1986), "true concepts." These concepts are characterized by referring to other words and not to the direct context of children, which provides them with greater stability and conventionality. The use of a certain way of speaking and thinking typical of instructional activities (definitions, learning of written language, learning of second language, etc.) promotes the development of a structure of thought, which allows the creation of generalizations with a high verbal component.

Thus, the emergence of scientific concepts transforms the way in which generalization has occurred so far with everyday concepts. This transformation is evident in the emergence of a *system* of generalizations. The author illustrates the process of generalization following the following geographical metaphor:

> "If we imagine the totality of concepts as distributed over the surface of a globe, the location of every concept may be defined by means of a system of coordinates, corresponding to longitude and latitude in geography. One of these coordinates will indicate the location of a concept between the extremes of maximally generalized abstract conceptualization and the immediate sensory grasp of an object (…). The second coordinate will represent the objective reference of the concept, the locus within reality to which it applies. (...) The "coordinates" of the concept determine all relations of the given concept to other, i.e., to its coordinate, superordinate, and subordinate concepts". (pp. 199-200)

In this sense, scientific concepts or "true concepts" involve not only different levels of depth and hierarchical relationships (length), as a generalization, but also relations of communality (latitude), that is, of a diversity of possible paths that unfold in the language in the reconstruction of the concept. In the words of Larrain et al. (2019): "Scientific concepts can be thought of as occurring through multiple equivalent conceptual paths emerging only when speakers have at their disposition more than one way to equivalently think of a word (a semantic system)" (p. 458). These scientific concepts are relevant precisely because they suppose the individual formation of conceptual systems, which occur through the use of specific functional ways of using language (Guzmán et al., 2022).

For this very reason, it is difficult for students (at all educational levels) to develop scientific concepts. It is not enough to teach a concept for another to learn it since what could happen is that students learn the word but not necessarily the concept. Therefore, although the word spoken for communicative purposes is not the concept, its use in social interaction is (pre) formative of the concept, while the concept is developed by trying different ways of generalizing the word of signifying.

Verbal thinking is a constructive process of generalization and of generalization of generalizations of various ways of producing. Since the process of generalization involves the

construction of a system in the functional use of the word, the reconstruction of this system is not static, but is a movement of thought. Therefore, conceptualizing consists of building and reconstructing a system and positioning the concepts in a certain mode of relationship.

The dialectical nature of concepts

Vygotsky (1986) argues that scientific concepts are defined by a structured system of meanings that enable systematic, stable, and conventional generalizations. This system goes beyond mere dictionary definitions, representing a specific, systematic interrelation of words manifested in particular linguistic uses. These relationships include similarity, contradiction, and hierarchy, among other systematic word relations or methods of generalization. Consequently, a fully developed concept embodies a relational perspective and a cognitive trajectory that constantly anticipates alternatives, as outlined by the underlying system (Larrain & Haye, 2014).

Moreover, every structure or system is built on the basis of oppositions and contradictions that draw the basic relational field. This is how we read Vygotsky's theory of concepts (1986): a concept, as a systematic way of thinking and generalizing, consists of contradictions that have a formative role in the system of meanings or words that act as foundation. In fact, if we were to prohibit contradictions, it would be impossible to imagine the system to which Vygotsky (1986) refers.

The dialectical nature of every concept is not a new proposal. Blunden (2012) already noted that every scientific concept is contradictory in itself. Moreover, the history of the production of scientific and disciplinary knowledge allows us to better understand this dialectical nature of concepts. Scientifically accepted ideas, in general, respond to alternatives that have been shown to be less effective solutions to answer the questions and problems that create them from a social, scientific, and political point of view. Thus, each historically produced concept, which is systematically linked to other concepts, does so in relation to refutation, approval, complementation, etc.

Concepts are not neutral and are directed at and stressed with other possible concepts. In the words of Bakhtin (1981) each word unfolds in a tense field of words from which it establishes all kinds of dialogical relations. Moreover, Billig (1996) raises a rhetorical notion of meaning that implies that each unit of thought and meaning has the structure of an argument that rises in the face of its opposing or counterargument. We may say that the contradiction is one of these structuring dialogical relations of both scientific activity and the structure of knowledge of disciplines.

It follows that if university students must reconstruct concepts as units of disciplinary and professional knowledge, they need to reconstruct not a dictionary definition, but an entire relational structure organized by strained relations of opposition and contradiction and, probably, with an argumentative structure (see Billig, 1997). How to achieve this? Our proposal is that argumentation, as a discursive practice, has a particularly important potential to promote the reconstruction of the dialectical and argumentative nature of every concept.

Argumentation as a process of generalization of contradictions.

Vygotsky (1986) emphasizes that the essence of concept development lies in the functional application of language. This perspective suggests that language, in its dynamic and varied utilization across social contexts, rather than as a static system, furnishes the means for conceptualization. Certain distinctive linguistic practices are instrumental in leading the way for the emergence of scientific concepts. In fact, the focus on language as a group of heterogeneous activities is shared by Wittgenstein (1953). Bakhtin's (1986) notion of discourse genres would also point to the diversity of forms of language according to the diversity of social activities, even more so than typical forms of social activity. Taking this into account, it is crucial to note that it is this diversity that is key to the formative power of language (Bertau, 2011).

In this framework, we understand argumentation as a particularly powerful social and language practice to promote the reconstruction of the dialectical structure of scientific concepts, while promoting a particular form of generalization: the generalization of relationships, including especially those of opposition and contradiction. While Vygotsky (1986) does not notice its particular role in concept formation, Piaget (2001) does recognize its unique role in the reconstruction of knowledge structures, especially when it happens between peers.

Arguing, as a functional use of language and as a verbal thought process, has highly specific characteristics of its own. According to Leitão (2000), argumentation has a potential for the construction of knowledge that is based on its semiotic mechanisms that move following a dialectical structure: argument, counterargument, and response. In the argumentation, a justified position must be constructed and raised, and any justification assumes the possibility of the emergence of counterarguments. Then, at the time of the counterargument, the individual has the possibility of reviewing their own position; for the author, this would account for a meta-cognitive process that favors learning. In this regard: The discursive actions of justifying positions and reacting to contrary positions reorient the individual's focus of attention from the phenomena of the world (on which they argue) towards their own statements (points of view, knowledge) about such phenomena [Las acciones discursivas de justificar posiciones y reaccionar a posiciones contrarias reorientan el foco de atención del individuo de los fenómenos del mundo (sobre los que argumenta) hacia sus propias afirmaciones (puntos de vista, conocimiento) sobre tales fenómenos] (Leitão, 2007, p. 16). Finally, we reach the answer, which is a critical process that may or may not integrate dissent between opposing positions.

Although Leitão (2000) identifies the epistemic potential of argumentation focused on its potential for revision of thought, since thought bends over itself to be revised, we emphasize another aspect so far less addressed: its potential for re-construction of contradictions. With the argumentation, then, the dialectical structure of the different concepts involved is generalized, tending their formation and re-construction at the individual level. It is not a question of forming a representation, but of reconstructing relationships between meanings of words in tension and contradiction, enriching a horizon of meaning that at first is obscure or opaque.

The formative character of argumentation has been recognized by other authors as an

essential part of its epistemic dimension. For example, de Vries et al. (2002) emphasize the role of argumentation in conceptual diversification. Larrain (2017) and Larrain et al. (2019), based on the theory of concepts of Vygotsky (1986), propose that the dialectical movements of argumentation promote the imagination and figuration of the complex and contradictory field of meanings that characterizes every concept. Our proposal embarks on this line of thought, emphasizing the potential of the construction of concepts through the use of argumentation. Since its constituent movements (argument and counterargument) would allow the reconstruction of the contradictory and relational nature of scientific concepts through the progressive generalization of this difference. These discursive movements involve the possibility of constructing and reconstructing the process of generalization, trying new ways of generalizing the concepts put in dispute.

Argumentation, as a social and discursive practice, and as a linguistic activity that contributes to the development and refinement of disciplinary and professional concepts, extends beyond interactions between two or more individuals. Following Leitão (2000) and Billig (1996), we recognize the rhetorical and dialogical nature of argumentation as a type of language that, although used by a single speaker, contains different positions and relations of contradiction and response. Thus, we conceive of argumentation as a type of language that can be appropriated, developing what we call individual argumentation skills, and internalized, which is transformed and used not to influence others but ourselves (Kuhn, 2018).

From the previous reflection we can claim that, if internalized, argumentative language can serve to reconstruct concepts even when it is not argued with other people, but an argumentative dynamic is developed on an individual level. Moreover, following recent results (Larrain et al., 2020), it is possible to think that the epistemic dimension of argumentation always involves, at least in part, the use of internalized language promoting the formation of concepts through it.

Discussion

The central objective of this study has been to raise a vision of argumentative practice emphasizing its epistemic character. The relationship between argumentation and the construction of knowledge is long-standing. However, the notion of argumentative practice as a pedagogical means of knowledge construction has had more impact on school education than on university education. Moreover, at the university level, there remains a way of conceiving argumentation as a cognitive linguistic skill that depends on the previous acquisition of knowledge and not as a practice of knowledge construction.

In this paper we have raised the notion of argumentation, from a Vygotskian perspective, as a process of generalization – and therefore as a productive process of creating a system – of contradictions and tensions, which characterize scientific concepts. For this reason, we sustain that argumentative practice is a valuable resource, which, in itself, tends to the construction of scientific knowledge, especially when this discursive practice has been internalized.

We believe that emphasizing the epistemic character of argumentation is particularly relevant in teaching in higher education, for various reasons. On one hand, because of the

difficulty it poses for students, especially in their early years, to reconstruct, visualize and imagine a whole history of development of scientific knowledge regarding the discipline, as well as entering a new community with a highly specialized discourse. Blunden (2012) points out that concepts are historical and cultural products that involve interactions in language and social life forms. In this new communicative social context, the student will discover new words, new discourse(s), new concepts of each science and scientific discipline, or new ways of generalizing concepts already known.

On the other hand, we acknowledged that argumentative ability is crucial for professional practice and collaborative living. However, there is a concern regarding the proficiency of this skill among university students. Research indicates that argumentative practice not only contributes to knowledge construction and learning enhancement but also to the cultivation of argumentative skills (Vogel et al., 2017). Moreover, under our notion of argumentation, we believe that it is important to develop argumentative skills through argumentative practice, given the ethical dimension of not doing so.

From the perspective we have adopted in this discourse, several implications emerge. Initially, it is imperative to explore the role of argumentative practice within the university teaching context. This exploration is pertinent given the preliminary evidence indicating a lack of discussion and debate, which are anticipated components of university education (Archila et al., 2020). This evidence aligns with the broader challenges faced by higher education in fostering an active learning environment where students engage in dialogue, discussion, and deliberation throughout their educational journey.

Another relevant aspect for which it would be useful to incorporate argumentation in teaching is the importance of the diversity of discursive uses and practices, which seems to be central to the development of thought (Bertau, 2011). This also means that incorporating argumentation as a pedagogical practice does not mean that all teaching throughout the curriculum is argumentative, but rather it involves students in a diversity of discursive practices. In this regard, and in the face of the practical and political challenges posed by the systematic and explicit incorporation of argumentation, it seems necessary to investigate empirically in what curricular space, moment, and in what way it would be more pertinent and effective to provide students with this resource to build knowledge.

One way to incorporate this type of dialogue is by systematically promoting spaces for discussion between peers, using methodologies such as university debates, problem-based learning, or dialogic argumentation practices in small groups or a whole class. For example, Argument-Driven Inquiry (ADI) is a recognized structured methodology with clear steps for teaching and learning science. Although the incorporation of these methodologies must be adapted to contexts.

Some clarifications related to the theory of concepts and argumentation understood from that place also bring implications for university education. In the university context, it is possible that the use of the word, for example, in evaluative contexts, suggests a deeper and more complex form of conceptualization than the student has done. This is likely considering certain forms of evaluation; for example, as Blunden (2012) points out, the task of characterizing a thing

or listing everything we "know" about something generates a pseudo-concept rather than a true concept. Conceptualization, as a process that develops ontogenetically, cannot simply be transmitted by an adult or university professor. Recall that the central thesis of Vygotsky (1986) is that concepts are developed, which means that the verbal thought process in which a generalization system emerges is a flexible and dynamic process as they are not static entities (Larrain & Haye, 2014).

In this paper, we have delineated a methodology to elucidate the processes through which flexible generalizations evolve and to examine the progression towards novel forms of generalization. In this regard, we believe that both conceptual development and argumentative practice are closely related processes. This is because all these movements that occur in argumentative language involve an organization of the specific generalization system, an organization of relations of generality in which the contradiction of the concepts is incorporated. In this sense, it is highly difficult to reconstruct and form concepts if students are not made to participate in certain ways of speaking, such as argumentation, that is. It is not a question of knowing about argumentation but of participating in this discursive practice in order to know how to argue and think disciplinarily.

If argumentation is understood in this way, it involves, at the same time, a way of thinking and using language. In this sense, although the process of generalization has been conceptualized as a process that occurs moment by moment, there are certain common ways of generalizing which are the result of educational instruction, the history of concepts, and the similar social situations in which we participate. In the university classroom, we want students to be able to reconstruct these conventional scientific generalization systems. However, arguing also makes it possible to question these common systems of generalization.

We have offered an interpretation of argumentation from the theory of concepts of Vygotsky (1986) that accounts for argumentative discourse as a process of generalization that occurs in communicative social interaction and that is formative in nature in thought and in the generation of knowledge. Evidencing, with it, the discursive, dialogical, and dialectical character of argumentative language and the construction of scientific knowledge. The perspective that we have conceptualized is in alignment with the proposal of Leitão (2000) as evidence of how, in the use of language corresponding to the discursive movements in argumentation, the student constructs a certain type of conceptual knowledge.

The incorporation of the theory of concepts of Vygotsky (1986) allows us to complicate and expand the notion of the construction of knowledge with that specific emphasis. Although we do not emphasize the metacognitive character of the practice as the author does, this is compatible as long as the systems of generalization are repeated and acquire a conventional character. Furthermore, both positions highlight the dialectical dimension of argumentative practice and, in our case, also of scientific concepts. We believe that it is relevant to continue theorizing in the epistemic nature of argumentation, in order to make sense of the available empirical evidence that relieves the epistemic dimension of this practice.

Final declarations

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