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Epistemic practices: implications of sociocultural theory for the construction of knowledge

Epistemic practices: implications of sociocultural theory for knowledge construction

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SUMMARY

Studies that consider the teaching and learning process from a historical, cultural, and social perspective have been gaining traction in the field of Science Education. These studies consider that social interaction stimulates the construction of scientific knowledge and develops particular ways of speaking, thinking, acting, and interacting, which are defined as epistemic practices. This study aims to reflect on the implications of epistemic practices for the construction of scientific knowledge in the field of Animal Science and their possible relationships with some assumptions of Vygotsky's Historical-Cultural Theory. Regarding the teaching and learning process, the reflections presented indicate a gap between what is established in the Curricular Guidelines for the Animal Science program and what is taught in the classroom.
Considering the epistemic practices relevant to this process, it was pointed out to possibility of deepening studies on this topic based on Vygotskian assumptions, since these practices develop in a context of interaction and are associated with a social and cultural process of knowledge construction. This
The proposal could be beneficial as it would favor the construction of scientific meanings for students in the field of Animal Science.
Keywords: epistemic practices, teaching, learning, social interaction.

ABSTRACT

There has been an increase of studies for Science Teaching that consider the teaching and learning process from a historical, cultural, and social perspective. These studies consider that social interaction stimulates the construction of scientific knowledge and develops ways of speaking, thinking, acting and interacting, which are defined as epistemic practices. The present study aimed to reflect the implication of epistemic practices for the construction of scientific knowledge for Animal Science and its possible relation with some concepts of Vygotsky's Cultural-Historical Theory.
Regarding the teaching and learning process the reflections made throughout this study indicated that there is a gap between what is established in the Animal Science Curriculum Guidelines and what is taught in the classroom. Considering the epistemic practices relevant to this process, research in this area may consider the Vygotskian presuppositions, since these practices are developed in a context of interaction and are associated with a social and cultural process of knowledge construction. Engaging in epistemic practices could be fruitful, as it would benefit the scientific construction meanings for students of Animal Science.
Keywords: epistemic practices, teaching, learning, social interaction.

Introduction

The debate surrounding Science Education in Brazil began in the late 1950s and early 1960s by scientists and researchers from Brazilian institutions coming only from the area of Education, concerned with the teaching and learning of their own areas of activity, especially Mathematics, Physics, Chemistry and Biology, giving rise to the creation of several research centers on Science Teaching.

Since the Second World War, science and technology have transformed in a huge socioeconomic undertaking, bringing greater attention to the study of science at various levels of education (KRASILCHIK, 1987). After the years 1950, the educational proposals of Science Teaching were greatly influenced by curriculum renewal projects developed in the United States and England. Such proposals prioritized the construction of scientific knowledge based on a mechanistic position, that is, students would only have access to scientific truths and a technicist way of thinking and acting. Therefore, the epistemological, social and interdisciplinary, which encourages the critical and scientific spirit of students, in view of the historical-cultural circumstances of society, was ignored in Science Teaching.

With the Military Coup in Brazil in 1964, as Leme and Brabo (2019, p. 83), “the conceptions of teaching resulting from a dominant educational project ended up bringing a fragmented training with the purpose of adapting the subjects to the environment in which they were inserted”. Let us not forget that the objective of Teaching Sciences, which took shape during this period, brought a perspective of teaching and learning that favored debate, discussion and reflection on the social role of science, therefore, the advancement of this area during this period contributed little to the teacher training, especially those in Science.

During the dictatorial period, positivism was considered as the basis for the process educational, in order to make it objective and operational, prioritizing technical rationality.1 In the last three decades of the 19th century, educational policies developed for a technical education led to the implementation of the minimum curriculum in which the

[1] According to Pèrez-Gòmes (1995, p. 99), the perspective of technical rationality assumes that social reality can be fitted into pre-established models—that is, into ready-made models where there are no complexities or singularities, uncertainties, or conflicts of values. Therefore, teacher training is imbued with a linear and simplistic conception of teaching processes.

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educational practices, used in the training of teachers and students, did not bring content that led them to awareness, on the contrary, tended to alienate them.

In this sense, researchers in the field of Science Education in our country, who already in the 60s they considered knowledge as a product of interaction of man with his world and emphasized the mental processes of students during learning, found themselves subjected to an empiricist conception of science, according to which theories originate from experimentation, reliable observations and objectivity and neutrality of scientists.

Therefore, the 1960s, 70s and 80s were marked by the elimination of pedagogical problems faced by education professionals, giving space to qualifications and their specificities. During this period, the courses prioritized training of a technical specialist who transmits knowledge, validated by a technicist pedagogy that separates theory and practice, reflection and action, content and form, teaching and research. Therefore, the school, students and teachers are evaluated for its efficiency and effectiveness. The knowledge base was based on technique and educational process became a process of control by eliminating, almost by complete, “its historical and political character, covering up and ignoring the contradictions that constitute reality” (FRIGOTTO, 1996).

From then on, scholars in the field of Science Education seem to have followed the scratches the programmatic content of school curricula, focusing essentially on products of scientific activity, which may have led to the acquisition of a vision neutral and objective science. Consequently, teacher training, especially in the dictatorial decades, it seemed to be based on a conception strongly influenced by political ideologies in our country which may have produced a great delay in the formulation of innovative proposals, which had already started to be discussed by researchers and teachers in the area of Teaching Sciences.

Concomitantly, the problems faced by the area of Science Education in our country, in the decades mentioned, research groups emerged that discussed, mainly, the necessary curricular renewal to promote the improvement of Education of Sciences. These groups contributed to the emergence and advancement of Postgraduate Programs in this area. Important organizations, such as the CNPq (Council of National Institute for Scientific and Technological Development) and CAPES (named at the time

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of the National Campaign for the Improvement of Higher Education Personnel), were fundamental for the implementation of the Science Teaching area.

The 1980s were marked by the emergence of new research groups intended for teaching and the construction of scientific knowledge, such as, for example, the Physics Teaching Group of the Federal University of Rio de Janeiro, coordinated by Professor Susana de Sousa Barros, and the Federal University of Minas Gerais for Professor Beatriz Alvarenga, the Education Research Group of the Faculty of USP Education led by Professor Anna Maria Pessoa de Carvalho, with a extensive publication in the area.

These are just a few examples that indicated the need for studies interdisciplinary, related to teaching and learning, which aimed at a movement for curriculum renewal in Science teaching in Brazil, encouraging "the importance of experimental teaching in science and, even more, the role that good curricular materials can play, allowing students to experience the scientific research process" (BARRA; LORENZ, 1986, p. 1982).

The numerous publications of articles, dissertations and theses carried out by the groups of research that have formed over time, and the emergence of great diversity of scientific journals on Science Teaching, helped to establish, in Brazil, a specific field of study called Science Education. The growing volume, in 1980s and 1990s, of scientific production in the area and the creation of programs Masters and Doctorate programs determined, in September 2000, the creation of a new Area Committee at CAPES: the Science and Mathematics Teaching Committee2 .

The results of the Evaluations of the Postgraduate Programs in Teaching Sciences, from their creation to the present day, available on the CAPES portal https://www.gov.br/capes/pt-br/acesso-a-informacao/acoes-e-programas/avaliacao, demonstrate the consolidation of the area in the country. This progress represents a long journey, in which the generation of scientific knowledge, produced by research groups and from various institutions, represents a significant amount of information great importance for teaching and learning from Basic Education to Higher Education Higher in the country.

[2] Called Area 46 – Teaching of Science and Mathematics, in which CAPES evaluates and certifies the Postgraduate Programs in the country - the area of Science and Mathematics Teaching.

Regarding the insertion of the Area in the social context, Araújo-Jorge and collaborators (2017, p. 3) propose that a series of factors be considered in the moment of evaluation. These authors indicate, for example, the creation of projects and university extension activities, activities related to the dissemination of results research, teaching and extension for society, the use of science and technology resources knowledge in improving the living conditions of the population and in resolving most important social problems in Brazil.

Still, there is a lack of studies that offer a systemic view of the scientific knowledge that is generated, resulting from the Teaching Area, and its direct relationship with different fields of knowledge, such as Animal Science, which falls within the Agricultural Sciences Area. Despite advances in the Teaching Area, there is a gap between what is produced in Postgraduate Programs, regardless of the area, and what is taught in the classrooms. Among the reflections that come being carried out on Science Teaching and its interdisciplinary character for all fields of knowledge, and here, again, we include Animal Science, it is necessary to think innovative proposals that aim to introduce content related to teaching and learning in the curricular matrices of Undergraduate and Postgraduate courses in the area of Agricultural Sciences so that students in this Area are also able to enter teaching.

Despite advances and improvements in the structuring of Science curricula Agricultural, specifically for Animal Science, a discipline related to Teaching Sciences, is not yet present in the Undergraduate Program of the aforementioned course. In the Programs of Postgraduate studies this process is still in its embryonic phase, few, or almost no PPG in Agricultural Sciences in Brazil offers students training teacher for teaching, as well as the process for the formation of scientific concepts.

In view of the constant transformations and demands of society, teacher training for Agricultural Science students must be rethought in academic scope not only in a linear and fragmented way, but rather from a interdisciplinary vision between the different areas of knowledge. We understand that the challenge is complex, as it requires that teaching and learning in this area be also thought out, taking into account proposals that consider the local needs of contexts in which they are inserted.

In foreign literature, Cachapuz, Praia and Jorge (2004) argue that a proposal for the scientific training of students in Science Education must be focused,

also, for a broader process of Science Education (CE). To this end, consider epistemology as an interdisciplinary area that integrates relevant fields of knowledge, such as, for example, the Philosophy of Science, the History of Science, the Sociology of Science and Educational Psychology, taking it as a frame of reference for a innovative and coherent dialogue between different areas of knowledge. Therefore, if he must:

> [...] proceed to appropriate relevant knowledge from other disciplinary areas. We would even say that it was not possible for Science to assert itself as a progressively developing scientific disciplinary area without being strongly linked to those disciplinary fields. But this process of appropriation, that is, the nature of the transpositions, is not insignificant. The transpositions are not intradisciplinary projections of the original disciplines; that is, the final theoretical framework resulting from these appropriations involves a process of elaboration specific to the new area of knowledge (Science Education). It could not be otherwise, since it is important that such a process leads to a self-coherent whole (a theoretical framework of identity) capable of tentatively providing adequate responses to teaching, learning, and training problems in their concrete globality. (CACHAPUZ; PRAIA; JORGE, 2004, p. 364).

These authors emphasize that "it is necessary to replace the traditional view of knowledge as something stable and secure by something endowed with complexity that has to constantly adapt to different contexts and whose nature is uncertain" (2004, p. 366). In this way, they ensure that no less important than the current methodologies of Science Teaching adopted in the classroom, the construction of knowledge by individual, specifically the scientific one, becomes essential for current approaches can actually be implemented in school practice.

They also understand that Science Education must begin with education basic, which is already mandatory for everyone, at least at the formal level of Portuguese education. However, the debate on this issue should not focus solely on *"for whom" or "what"* (question of curricula) *and "how"* (question linked to work strategies), but, being linked to the question of *"what for",* that is, the social justification of knowledge, a since "educational systems in recent years have not been able to offer answers to this question in order to help younger people understand the importance of the 'scientific/technological effort'" (CACHAPUZ; PRAIA; JORGE, 2004, p. 366).

In this sense, Cachapuz, Praia and Jorge (2004) support a dimension contextualized science, which means starting from the conceptualization of contexts in which phenomena occur, that is, their social dimension. To this end, they opt for a

constructivist learning orientation, considering it as a social process and culturally mediated. Therefore, they value "the understanding of situations and sociocultural contexts in which learning takes place and how it is influenced by such situations and contexts" (CACHAPUZ; PRAIA; JORGE, 2004, p. 375), based on Vygotsky's perspective3 in relation to the influence of interaction social and cultural aspects in learning processes.

What is important to highlight is that interdisciplinarity and epistemology become centralizing agents for the construction of scientific knowledge by allowing the student to move between different fields of knowledge to, in fact, build this knowledge and be able to produce it and not just repeat it without understanding it. Furthermore, the emphasis on knowledge as a social enterprise begins to acquire fundamental contours in Science Education. According to Kelly, Chen and Prothero (2000, p. 702) in Education, epistemology is fundamental to the development of educational theories of learning; is linked to change conceptual of students and is investigated as a domain of the nature of Science

Kelly, MacDonald and Wickman (2012) suggest that learning theories necessarily presuppose views of knowledge, therefore, they consider that the way students' way of learning is influenced by three different epistemological perspectives: educational *(disciplinary knowledge),* personal, and social. These authors discussed how knowledge is operationalized, negotiated and how these perspectives epistemological influences the learning of science.

While the traditional view of science was strongly characterized by formal logical discourse of the Vienna Circle, in the first half of the 20th century, with the emergence of new reflections on scientific practice, inspired by the work *A Structure of Scientific Revolutions,* by Thomas Kuhn, in the second half of the same century science also begins to be seen as a social and historical movement.

Thomas Kuhn (1998) associates science with a task of improving theories, with its development linked to these theories. In other words, for the author, the scientific knowledge is generated, analyzed and problematized culminating in revolutions, when paradigms no longer hold up and are therefore modified or

[3] In this work, the spelling *Vygotski* was chosen to refer to the author, whose name appears spelled in various ways in the literature consulted, maintaining the original spelling in the case of references and citations.

[4] Kelly, MacDonald and Wickman (2012) use the term *disciplinary knowledge* to indicate types of knowledge associated with specific academic areas (or academic disciplines) such as Engineering, Biology, Mathematics, Chemistry and so on.

replaced by a new way of evaluating phenomena. This new way of evaluating such phenomena, according to the author, is loaded with random elements composed by personal and historical eventualities and can be considered "belief-forming espoused by a specific scientific community at a given time" (KHUN, 1998, p. 23), that is, such phenomena are loaded with a specific historicity.

In this sense, Science Teaching when thought of from a perspective epistemological, sociocultural and historical, presupposes that "individuals recognize the sciences as an area of knowledge of humanity" (SASSERON; DUSCHL, 2016, p. 53). Therefore, it becomes necessary to reflect on the interactions that develop in the social plan of the school context as an activity that is conducted in environments cultural and institutional. The hypothesis of a sociocultural perspective for Education in Sciences "directs the focus of attention, both in teaching and research, to the interactions that develop on the social level of the classroom" (SILVA, 2015, p. 71).

According to the aforementioned scholars, Science Education must bring to the classroom in class the discussion of concepts, laws, models, scientific theories and, in particular, the epistemological elements of science. Within this context, students will have the opportunity to understand Science as an investigative area that produces and builds knowledge, observes and improves rules and practices.

Therefore, following this line of reasoning, the school, as an institution educator, must offer the opportunity for students to improve and improve ways of thinking and conceiving ideas, bringing them closer to the ways scientific, in addition to enabling access to new information and observation contexts and research, resulting in active and interactive participation of subject in the elaboration of innovative actions that meet the demands of contemporaneity.

In an article published by Kelly and Green (1997, p. 1), the authors identified, through the analysis of discursive processes and practices, how knowledge is constructed, positioned and appropriated in the school environment. Furthermore, these researchers pointed out that discursive practices, identified by them as social mediators can produce or construct scientific knowledge, within a certain academic community. This study demonstrated that scientific learning does not should be based solely on a ready-made disciplinary structure, that is, based on curricula, but the sociocultural practices involved in this must also be taken into account knowledge acquisition process (KELLY, GREEN, 1997, p. 2).

Based on studies carried out by Bloome and Egan-Robertson (1993), Knorr-Cetina (1995), for example, Kelly and collaborators (1998a, p. 24) suggest that "discursive practices (oral, auditory, visual and written) are cultural tools that members of a group use to construct knowledge." In other words, these authors indicate that when members of a given community (scientists, students, etc.) interact over time to produce knowledge specific, "they create through social interaction particular ways of speaking, think, act and interact" (KELLY *et al,* 1998a, p. 24).

Kelly and his group (1998a, p. 26) emphasize that "a sociocultural perspective points out that the context in which knowledge construction occurs should be understood as socially constructed through interactions between participants in a social situation". In this way, sharing this knowledge favors the learning, especially for those students who had little (or almost none) contact with science (scientific theories and practices in general). Therefore, according to Kelly and Chen (1999, p. 885), from a Vygotskian perspective, in moment of interaction, the student becomes socialized in the "semiotic-behavioral-perceptual" of a given community, in which the language plays an important role in the organization of this system.

In an article published in 2001, Kelly *et al* (p. 137), highlight studies carried out by Garfinkel *et al* (1981) and Amann and Knorr Cetina (199, p. 92), in which these authors indicated that, to analyze scientific practices in the school environment, it is necessary to examine what knowledge members or students already have and how these are shared at the time of interaction. These analyses can be performed using texts, theoretical references, experiments related to the discipline in question, among other cultural elements.

These studies indicated that learning, which occurs in the classroom, takes place through discursive and interpretative processes at the time of their interaction. According to the aforementioned authors, the investigation of how educational processes and as the social practices of a given community, based on a sociocultural perspective, are constructed to give rise to what is considered as science, can be seen as a methodology of analysis. This view proposes that both the area of science and the area of education as sociocultural activities, are carried out *(in situ)* through standardized ways of acting, speaking and knowing, and these forms, when standardized, become epistemic practices.

The authors further discuss that an important aspect for participation in science is the learning of these epistemic practices, which are associated with the spheres social production, communication and evaluation of knowledge. To analyze the learning of epistemic practices, Reveles, Kelly and Durán (2007, p. 467), if based on the investigations suggested by Kozulin (2003, p. 15) in which the author, based on the Vygotskyan perspective, suggests that it is necessary to change the orientation individualistic learning for sociocultural orientation. For Kozulin, the key concept in this new orientation is the use of psychological tools, represented by "symbolic artifacts – signs, symbols, texts, formulas, graphics – that when internalized help individuals master their own psychological functions," being that "each culture has its own set of psychological tools and situations in which these tools are appropriate."

In a recent publication, Kelly and Licona (2018, p. 140) reflect on the construction of scientific knowledge in the school context through practices epistemic relations that are established between the subjects of this environment. That is, as a a given group justifies its knowledge through social practices, which are understood as a set of standardized actions based on intentions and common expectations of individuals who share cultural values and tools. When these actions relate to knowledge, they are called practices epistemic.

Reflecting on investigations carried out by Kelly, it is possible to understand that the epistemic practices, when analyzed in the school context as interactive, contextual and intertextual, including the use of signs and symbols, are presented as the result of a given academic activity. As these activities are developed and routinized by the members of a given group, can be recognized as patterns and these, in turn, become actions that can be learned through social interactions and are able to generate new knowledge.

As we can see throughout this text, the aforementioned scholars (CACHAPUZ *et al,* 2004; DUSCHL, 1990; KELLY and GREEN, 1997; KELLY, MCDONALD, WICKMAN, 2012; KELLY and LICONA, 2018; KNORR-CETIN, 1995; KOZULIN, 2003; NARDI, 2001; SASSERON and DUSCHL, 2016; SILVA, 2015; WICKMAN and ÖSTMAN, 2002a-b), took as a basis some principles of the theory of

Vygotsky, with emphasis on the role of social interaction as fundamental to the development and teaching-learning process.

Based on the author's ideas, the importance of the contributions can be seen of his theory to the researchers mentioned above, because, according to Vygotsky (2009), sociocultural practices manifest themselves in contexts of school interaction, in which language "acts decisively on the structure of thought and is a basic tool for the constitution of knowledge" (p.398). Thus, Kelly and Green (1997) agree with Vygotsky's formulations, when elucidating that the patterns discursive (taken by them as signs), which manifest themselves in contexts of school interaction and which are the result of the social practices of that specific group, can be considered as social mediators to produce or construct the scientific knowledge. Furthermore, when members of a given community (scientists, students, etc.) interact over time to share and produce specific knowledge, "they create through social interaction ways particular ways of speaking, thinking, acting and interacting" (KELLY *et al,* 1998a, p. 24).

Knorr-Cetina (1999, p. 321) emphasizes that learning science is a cultural process "therefore, conditioned and conditioning the contexts in which it is develops and is directly related to interpersonal relationships belonging to this". Therefore, the discursive processes (oral and written) mediated by the teacher, or a more experienced companion, in the school environment, play a role fundamental to identify how the construction of knowledge is carried out in the moment of interaction.

We understand that, as developed by the author, this is the concept of Zone of Proximal Development (ZPD), formulated by Vygotsky. Also Kelly and his collaborators (2001, p. 137), suggest that to analyze scientific learning in school environment it is necessary to examine what knowledge students already have (level of proximal development) and how these are shared at the time of interaction. According to the authors, this analysis can be carried out using texts, theoretical references, experiments related to the discipline in question, among others cultural elements.

Oliveira (2003, p. 34), also supported by Vygotsky, highlights that in the process of individual development, qualitative changes occur in the use of signs, in this way, "symbolic systems are developed, which organize signs into complex and articulated structures". In other words, according to the author, over the course of the

development process, the individual no longer needs external marks and begins to use internal signs, which are configured as mental operations that replace real-world objects, which will allow you to establish relationships mental, such as planning, comparing, remembering, in the absence of their own objects. Such mental operations do not relate directly to the real world, but, are mediated by internalized signs, freeing the individual from the need to concrete interaction with the objects of your thought.

The process of internalizing cultural forms of behavior does not carried out passively, but rather through a process of transformation and synthesis dialectic. Throughout his development, the individual inserts himself into certain groups that already have culturally established meanings. In this case, the external social activities and interpersonal functions become activities intrapsychic internal, mediated by internalized signs.

The elements that mediate the relations between the individual and society, the instruments and signs, imbued with cultural meaning, indicate that [...] “the symbolic systems, and particularly language, play a fundamental role in communication between individuals and in establishing shared meanings that allow interpretations of real-world objects, events, and situations” (OLIVEIRA, 2003, p. 40).

In Vygotsky's (1934 / 2009) studies on the relationship between thought and language, the question of the meaning of words takes a prominent place in its theoretical writings. For the author, the meaning of the word reflects in the simplest way the unity of thought and language, that is, [...] “it is an indecomposable unity of both processes and we cannot say that it is a phenomenon of language or a phenomenon of thought” (p. 398). Meaning is then a constitutive feature indispensable of the word, insofar as a word without meaning is not a word, it's an empty sound.

To justify the discursive patterns of certain specific groups Reveles, Kelly and Durán (2007, p.467), based their work on Kozulin’s studies (2003), who proposed changing Vygotsky's individualistic orientation regarding learning for a sociocultural orientation, as we have already indicated. When examine the psychological tools (symbolic mediation) and the process of internalization for appropriation of these tools by students, such as researchers concluded that once these psychological tools are internalized and become

become part of the students' own individual way of doing science, they start to do also part of the collective way of thinking and doing science within the classroom, a since meanings may be shared by members of certain groups.

Considering that epistemic practices have as their central point the development of ability to know, learn and transform prior knowledge and as such practices, in moments of interaction contribute to learning, it would be possible think about how interpersonal relationships between students in the field of Animal Science develop and improve the construction of scientific knowledge.

Although there are many publications that discuss epistemic practices for areas ranging from Elementary Education to some areas of Higher Education, such as Oceanography and Engineering, there are still no studies that use epistemic practices to evaluate the construction of scientific knowledge for the area of Agricultural Sciences, more specifically, for Animal Science, the object of reflection of this article. In the case of Engineering, epistemic practices are analyzed through pre-existing projects that require an understanding of science, mathematics and contexts relevant cultural aspects of the area. Therefore, we emphasize the importance of "the study of knowledge construction needs to occur in situ, through the examination of processes that lead to socially agreed-upon knowledge" (Kelly and Licona, 2018, p. 160).

In the field of Animal Science, teaching still seems to be based on a conservative and technicist conception, in which specific and pedagogical knowledge are worked in isolation, highlighting an organization of contents decontextualized, disconnected from practice and social problems, which, consequently results in fragmented learning. As Silva points out, Fonseca and Roldão (2015), the curricula of courses in this area of Science present predominantly technicist and productivist content since the mid-19th century. 1960s, in order to meet the demands of agricultural education, research agriculture and rural extension aimed at modernizing agriculture. Therefore, it becomes if necessary and urgent the formulation of new training proposals, with the aim of contemplate epistemological approaches that emphasize sociocultural and historical views of science and technology.

Despite advances and improvements in the structuring of Science curricula Agricultural, specifically for Animal Science, a discipline related to Teaching Sciences, is not yet present in the Undergraduate Program of the aforementioned course. In the Programs of

Postgraduate studies this process is still in its embryonic phase, few, or almost no PPG in Agricultural Sciences in Brazil offers students training teacher for teaching, as well as the process for the formation of scientific concepts.

Finally, we believe that the studies carried out by Kelly and collaborators and Vygotsky could make significant contributions to Animal Science students, about the relationships between teaching and learning in the process of constructing the knowledge, from sociocultural perspectives, so that they can have opportunities to develop innovative ideas in line with the context in which they are made part and as future professionals in this area of activity.

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