

The neuroscience of learning and the socioeconomic influence on the development of cognitive skills

Abstract

The purpose of this work is to critically analyze the relationship between the neuroscience of learning and the socioeconomic influence on an individual's cognitive development, addressing events that can cause exclusion in learning processes. It highlights vulnerabilities in the socioeconomic context as situations that enable social exclusion and, consequently, a possible deficiency in the development of cognitive skills. It questions how to promote the development of cognitive skills without room for exclusion. This bibliographic study reflects on neuroscience, addressing cognitive abilities, the interaction of humans with their environment, and human development and its social context, relating philosophy and psychology as factors of clarification and investigation. The process of scientific knowledge, demonstrated by neuroscience research, confirms the interdependence of human development within the cultural, biological, and socioeconomic context. Neuroscientific development has shown that the being is bio-psycho-social and that the level of experience of the being with the environment in which they live will interfere, positively or negatively, in the improvement of their abilities.

Keywords: neuroscience, learning, socioeconomic reality, cognitive abilities, interaction

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Introduction

The socioeconomic context and its influence on human development is the focus of this final paper for the Specialization Course in Philosophy. This endeavor was carried out through bibliographic research, focusing on the neuroscience of learning, aiming for a deeper understanding of issues that can influence cognitive development in human beings. The objective of this research was to demonstrate the vulnerability of an exclusionary system in psychosocial, teaching-learning, and professional processes, based on cognitive skills. It aimed to show that such development depends not only on biological factors but also on the environment and its influence on the social and cultural context in which the individual lives and interacts. To better understand the methods used in this research, we analyzed data from the Programme for International Student Assessment (PISA).ⁱ Programme for International Student Assessment – which shows aspects of student development, as the program aims to produce indicators that contribute to the discussion of the quality of education in participating countries. Recent data in the area of socioeconomic context show that social inequality in Brazil has been steadily increasing since the second quarter of 2015 and continues to grow into the second quarter of 2019.ⁱⁱ This progressive inequality may also be the major negative influence observed and reflected in the country's stagnation, based on PISA data in the global education ranking.ⁱⁱⁱ Furthermore, according to the most recent aspects of economic research from IBGE (Brazilian Institute of Geography and Statistics), social inequality has contributed to the depreciation of income and a worsening of the socioeconomic context of Brazilian citizens.^{iv} Following a line of consideration, in addition

ⁱPISA data published on the Ministry of Education's website, which shows and compares educational.

ⁱⁱAccording to data collected by the Getulio Vargas Foundation and published on the *Veja* magazine. 2020.

ⁱⁱⁱConf You data of Pisa they can to be checked for the site of G1. 2020.

^{iv}Analysis of social inequality. See official IBGE website: In addition to the news agency of the same organization. 2020.

to having as a “backdrop” the socioeconomic data analyzed by PISA, in a brief overview of neuroscience, we analyzed that the environment influences cognitive abilities, the learning of philosophy, and education in general, contributing to human development. In the first section of this article, we begin by discussing some neuroscientific studies: the neuroscience of learning, genetic influence, the interdependent role of the environment in human development, and the pedagogical necessity of these studies in teaching and learning processes. Subsequently, in the second section, we present philosophical studies that address the interaction between humans and the environment and delve deeper into the influences of the socioeconomic context on cognitive development. In the last section, we will briefly discuss the epistemological foundations that underpin both neuroscientific studies and the most recent philosophical and psychological studies in the area of educational learning processes. These philosophical and psychological foundations support the relationship between philosophy and neuroscience; that is, they unite cognitive capacity and philosophical theories of learning, leading us to question the influences of this human development. In this sense, we perceive that philosophy speaks to the emergence of neuroscience, within its philosophical aspects, based on phenomenological theory, thus bringing clarity to the explanation. Finally, the conclusion, which critically reflects on the aspects analyzed, may provide a greater understanding of the need for neuroscience studies on cognitive abilities and the influence of the environment.

Advances in the neuroscience of learning and human development are helping to elucidate cognitive abilities

Scientific studies on the human capabilities we inherit genetically and which develop over time demonstrate that evolution does not occur solely from physiological development alone, but can be influenced by the environment.

According to Davis and Ramos de oliveira,¹ development is the process through which an individual actively constructs their characteristics in the relationships they establish with the physical and social environment. This means that human characteristics are not only biologically inherited, but also historically formed throughout the development of generations. Other studies and research in neuroscience show that the development of cognitive abilities is a process of maturation of neural networks, that is, the deposition of successive layers that form neuronal arborizations, which is shaped in the course of the cognitive games of the newborn and infant, by signals from the physical, social, and cultural environment.² Benedict Carey,³ in the field of Neuroscience of learning, in his book on “how we learn,” discusses learning abilities in different contexts and the capacity of memory to store new information. The author repeatedly emphasizes throughout his work, based on various cited research studies, how much context and environmental stimuli interfere with cognitive abilities from the earliest developmental stages of an individual.

As the author states, at birth, a child goes through several developmental phases that are neurological, psychosocial, and cognitive. Neurological maturation is a limiting factor for cognitive development, as babies, for example, have the ability to learn from what they can see, hear, smell, taste, and touch; thus, they learn about the world and themselves through sensory and motor activities. The natural process of human development begins with the innate capacities of the baby, and throughout life these will either consolidate, or not, into acquired skills and competencies. Today, recent research, such as the human genome project, reveals the influence of external factors, including on genetic development and the functions of human genes, an area called epigenetics.^v They show how much the environment influences the development of human capabilities and skills. Throughout neuroscientific studies, ways to quantify and qualify abilities have been discovered, one example being the measurement of intelligence, and in this context, IQ tests and others such as reasoning tests have emerged.^{vi} As well as studies of cognitive abilities that demonstrate the influence of the social environment.^{vii} It is estimated that difficulties in developing neurocognitive learning abilities occur in 15% of cases from the first to the sixth year of schooling; however, although learning takes place in the brain, it is not always the cause of the observed cognitive difficulties, as one cannot assume a genetic malformation, and the context must always be taken into account.⁴ Neuroscientific development has demonstrated that beings are bio-psycho-social and that the level of experience a being has with its environment will interfere, positively or negatively, in their development. Enhancing their abilities. Cognition and metacognition influence current educational pedagogies and studies on learning in the school setting. Along these lines, intervention research has emerged that, based on cognitive psychology, aims to improve learning potential through the development of metacognitive

skills. Metacognition is defined as the human capacity to monitor and self-regulate cognitive processes.^{5,6} According to the Information Processing (IP) approach, for this to happen, the individual's cognitive system would be provided with a control subsystem, which would monitor and regulate cognitive processes. This metacognitive control, most of the time, and especially in young children, occurs without conscious awareness of the monitoring and self-regulation processes. However, as cognitive processes are more demanded by more complex life situations, metacognitive processes become more conscious. In these situations, metacognition is defined as the ability to consciously reflect on one's own cognitive and metacognitive processes.⁷ The field of neuropsychology, which studies executive functions, suggests a separation between metacognition and cognition. Thus, we understand metacognition as a high-level processing phase, acquired and developed through experience and the accumulation of specific knowledge, which is composed of two types of behavior: self-evaluation and self-management. This knowledge, therefore, would allow teachers to work on developing learning skills in a “learning to learn” approach.⁷ Based on certain relationships that influence individual development, we can say that the interaction between the individual and the environment is what can explain the greater or lesser psychic development in children, and, in this context, maternal education acts as a risk factor in cases of low education or as a protective factor when compared to higher education.⁸ Environmental stimulation is one of the pillars of linguistic development, and it is more frequent and of higher quality when parents have higher levels of education. Given the importance of parental learning and its influence on offspring, it becomes evident that the family's socioeconomic context, as well as forms of education and social interaction, influence and transform each child's neurocognitive abilities. Indeed, as we have seen above, what is not taught is not learned, since every capacity is there to be developed. Brain development remains quite immature until the age of two, when neuronal connections are almost at their peak. Therefore, according to Cosenza and Guerra,⁴ interaction with the environment is important, as it confirms or induces the formation of neural connections. We observe that environmental stimulation, that is, the relationship with the context. Socioeconomic factors are extremely important for the formation of neural connections that will enable learning. What is actually demonstrated is that the environment can lead to adaptive behaviors that can hinder or facilitate learning. An example of neuroscience in teaching and learning processes can be observed in the thinking of M. Lipman.⁹ He argues that it is precisely this interaction with others and with reality that we must recover in cognitive development. The Lipmanian approach to education seems to function as a cognitive strategy, favoring students.⁹ Favoring because it does not see the child as a passive being or a “blank slate,” but rather provides self-regulation of learning and co-responsibility in the teaching process. Today, in academia, it is demonstrated that learning is linked to teaching patterns, in which individuals receive the necessary stimuli for their development. Neuroscience analyzes, in its studies, these neural reinforcements in the cognitive capacity of the subject who tends to learn due to their ability to interpret, but mainly to relate to others and to the environment they frequent.

The socio-interactionist approach: a way to understand the socioeconomic influence on cognitive development

Socio-interactionism is the name given to Vygotsky's philosophical approach. It is the theory of development and learning that most closely aligns with the concepts of neuroscience and neurolinguistics, which affirm the influence of the social environment on cognitive

^vTo delve deeper into the topic of epigenetics or the concept of it as social DNA, we suggest articles such as: "Social DNA can change our individual DNA". In addition to: Epigenesis and epigenetics: the many lives of Western vitalism. 2020.

^{vi}Regarding this research, according to Cosenza and Guerra,⁴ the heritability of general intelligence has a 30% influence in childhood, reaching 70% in adults, which makes it clear, according to the author, that genetics does not imply inevitability or destiny.

^{vii}Here, we must also highlight another researcher in the field of cognition: Robert Sternberg's alternative theory of intelligence that involves the socio-cultural context. We emphasize this definition because it closely resembles what we will discuss later regarding socio-interactionism when studying learning theories. To delve deeper into R. Sternberg's theory,⁴ in addition to his own doctoral work.

abilities. But what does it teach us in practice? This theory emphasizes the importance of the student's interaction with the environment, that is, the social environment and context, in their development and learning process. The student's social reality, interacting with the content and themes proposed in the teaching-learning process, and the application of these experiences to their personal reality, influences their cognitive capacity. The zone of proximal development, created by Vygotsky,¹⁰ presupposes the acceptance of this social interaction, as if it were a dialectical movement. The Interactionist conception of development is based on the idea of interaction between organism and environment, and views the acquisition of knowledge as a process constructed by the individual throughout their life, not being ready at birth, nor being acquired passively thanks to environmental pressures. Knowledge is not acquired passively, but through the interaction of the subject with their social environment and their environmental context. Henry Wallon^{viii} that It understands cognitive development as a social and interactionist process, stating that language and the social environment play a fundamental role in the individual's development process. From an epistemological standpoint, Piaget develops constructivist and interaction is relativist knowledge, which is not solely rooted in experience (empiricist) nor in thought (rationalist), but in the interaction and construction between the subject and objects/situations. The subject plays an active role in the construction of their knowledge and cognitive development. This means that their mental structures are specific to their developmental level, which is marked by stages.^{ix} It is through contact with the world that their knowledge is built. From Piaget's perspective, it is implied that humans possess a biological structure that enables mental development; however, this fact per se does not guarantee the triggering of factors that will promote its development, since this will only happen through the interaction of the subject with the object to be known. In this sense, interaction, according to Terra,¹¹ needs to occur in equilibrium; one method cannot override the other; subject and object interact in constant progress. In short, we can say that, for Piaget, equilibrium is the goal that the organism strives for, but which, paradoxically, it never achieves, since in the interaction process, environmental imbalances can occur that disrupt the organism's state of equilibrium. According to Piagetian theory, human beings, from birth, already possess hereditary knowledge (with biological and genetic bases) necessary for their survival.¹² In their contact with the world, individuals modify the schemas of their mental structures, because, for Piaget, knowledge is constructed from other knowledge. Knowledge originates from the assimilation of what the environment offers and its integration with what is already possessed. Therefore, the cognitive system to be constructed is necessarily an extension of the biological system, its construction being linked to the individual's survival in the environment.¹² Does a child or adolescent who lives in constant suffering, violence, and social vulnerability have the same neuropsychological developmental status? According to Piaget's theory, the answer is no. Learning and development evolve to a greater or lesser degree according to how behaviors and interactions with the environment influence the individual; even affectivity and the ability to express emotions are also affected. Thus, keeping Piagetian theory in mind, we can analyze learning development through various instruments that assess the relationship between our country's

education system and others, such as PISA,^x which offers information on the performance of students aged 15, with Brazil being one of the participants since 2000 (first edition), providing reliable and valid measures to assess student performance in Reading, Mathematics and Science, but also gathers non-cognitive information:

socioeconomic conditions of students and structural and process characteristics of the school context. Therefore, the assessments aim to describe a survey of the cognitive learning processes of students from various schools with diverse realities, and the data are compared with results from different regions of the country and even internationally. Therefore, we can state that: one of the most important variables associated with student performance, as evidenced in a vast body of national and international literature, is the socioeconomic context in which they live. Children and young people whose parents have lower levels of education, lower income, are unemployed, or hold occupations with low economic and social prestige are more likely to have poorer educational outcomes, such as classroom learning. In PISA, the variable representing the economic, social, and cultural status index (ESCS) is a composite measure, constructed based on a three-pronged approach: parental educational level, parental occupational level, and an index of household goods, educational and cultural resources present in the home. It is scaled to have a mean of zero and a standard deviation close to 1 for OECD member countries. For more information on the construction of this index, see the OECD technical report (2017).^{xi} When we talk about the social and economic context, we are referring directly to the environment, the place where the individual lives and interacts, and what this environment provides to the person in terms of development possibilities. The socioeconomic context has a negative influence, generating greater difficulties, when this environment is conditioned by a reality of social vulnerability. For Kazzman,¹³ social isolation in environments of social vulnerability generates cognitive inequalities.^{13,14}

Along the same lines and commenting on Vygotsky's theory, Carara¹⁵ states in his research that:

We must consider the influence of the environment on child development and learning, according to Vygotsky (1896-1934). For this author, the relationship between human development and the environment cannot be denied, with children and their environment mutually influencing each other. Therefore, according to Vygotsky's studies, children who develop in unfavorable environments, who witness and suffer violent practices within the family, with little parental stimulation, tend to have their development impaired and be influenced by the negative mediations to which their environment subjects them.¹⁵ Therefore, the individual finds himself enveloped by his social environment, which he is not to blame for being. Influenced by it, thus showing in their learning capacity the reflections of interaction with their social environment. When this interaction occurs negatively, we can understand the social inequalities of the environment as promoters of social vulnerability understood as a lack of basic resources. Social vulnerability is reflected in economic data and has implications for the lives of individuals in all phases of their development.^{16,xii} Brazil's socioeconomic data, reflected in the country's stagnation in the world education rankings according to PISA data, indicate social and income inequality, also illustrated by the Gini index.^{xiii} This, which

^{viii}Conf. Search node site from the Infoescola. Cognitive theory. 2008.

^{ix}We will not delve into the Piagetian stages of development and their implications here. Thus, not all individuals achieve formal thought, and there are interindividual variations, or they may not reach it in all domains, which is the basis of his entire theory. However, in addition to the books in our bibliography, we recommend the article: Conceptions about development and learning according to Piagetian psychogenesis. Andréia Osti.

^xTo understand better the report of Pisa.

^{xi}For a comprehensive evaluation of this research, please refer to the reliable source. 2018.

^{xii}To further explore this relationship between social inequalities and vulnerabilities, we refer to our source: CONEDU. 6th National Congress of Education. Costa, Evyla da Silva. 2019.

^{xiii}Idem introduction and Conf.

measures the scale of inequality, also shows that a large portion of the population lives in a situation of social vulnerability. This situation leads to a reality of exclusion because it deprives people of access to the means of development. Consequently, it influences educational systems by failing to promote learning and cognitive development. Social inequalities, such as extreme poverty, exclude children from the means by which they could qualify and develop their cognitive abilities. First and foremost, it is crucial to remember that poverty must be analyzed as a generator of exclusion and, within the psychic and social realm, a cause of pathologies that can lead to the disintegration of the “social self” and even social violence. Violence is also another factor that, along with poverty, is intrinsically involved in the issue of exclusion as a cause of social vulnerability. However, following this line of thought, it must be considered that poverty in modern Western societies is seen as something intimately linked to social exclusion, preventing individuals from accessing essential goods and services, such as education, where we have the opportunity to learn, as Souza¹⁷ tells us.^{xiv} What this brief look at the context demonstrates is that, in fact, the environment can lead to adaptive behaviors that can hinder or facilitate learning. Opportunities for cognitive development are necessarily conditioned by the environment in which we live. How can we learn if we don't receive the means and conditions to do so?

According to Vygotsky,¹⁸ the development of thought and cognitive abilities proceeds from the social to the individual. Understanding the school environment as a social setting, the stage for learning, whether of language or other skills, the teacher acts as a mediator and not as the protagonist (possessor of imponderable knowledge). The author emphasizes the role of the school in this mental development of children, and his thought is one of the most studied theories in contemporary pedagogy: In it, man is seen as someone who transforms and is transformed by social relations. What occurs is an interaction (dialectical) between the human being and the social and cultural environment in which he is embedded; that is, human development is understood as the product of biological and environmental factors that act on the organism, determining its behavior. According to Rego,¹⁹ Vygotsky's theory highlights the importance of social interaction for the development of human beings who are a product of the culture built throughout history, differentiating us from animals (not only possessing lower psychological functions). We have voluntary actions, in which the individual, immersed in this society, presents a dialectical interaction, because “at the same time that the human being transforms his environment to meet his basic needs, he transforms himself, that is, he transforms the environment and is transformed by it”.^{19,20} By this definition, the sociocultural approach of Vygotsky and Piaget, in its historical foundations, refers to the empirical method of investigation, which had its most prominent exponent in Freire. Currently, for Freire, the person is the subject of their own education; that is, education occurs through reflection. about man and through the analysis of the environment in which he lives.²¹ Paulo Freire^{22xv} tells us that curiosity is essential for the construction of knowledge, but we should not be driven solely by it or seek to satisfy it in what we find immediately. He, who was one of the greatest exponents of pedagogy, says:

As a teacher, I must know that without the curiosity that moves me, that unsettles me, that inserts me into the search, I neither

^{xiv}Cf. SOUZA,¹⁷ 2012: “Social exclusion, in turn, invokes a fracture in the bonds between the individual and society, fostering a break in the very social unity and thus generating violence. To delve deeper into this intrinsic relationship between exclusion, poverty and violence, see the work of Rodrigues et al., 1999, p. 66; In: SOUSA, 2012.¹⁷

^{xv}Sobre Paulo Freire a vast amount of literature about Paulo Freire available online in PDF format. But to learn a little about his history and theories.

learn nor teach [...] with domesticated curiosity I can achieve the mechanical memorization of the profile of this or that object [...] The construction or production of knowledge of the object implies the exercise of curiosity, its critical capacity to “distance oneself” from the object, to observe it, to delimit it, to divide it, to “surround” the object or to make its methodical approach, its capacity to compare, to ask.²² Enhancing cognitive abilities and skills also involves becoming aware of the influence of the social environment. The more aware we become, the more we “unveil” reality [...] It cannot exist outside of praxis, that is, outside of the “action-reflection” act.²³ We emphasize, therefore, that for Paulo Freire, interaction cannot be passive, because if it is, learning and critical thinking fade away in the voice of the other, which becomes the only truth.

Philosophy and psychology as epistemological bases for understanding the development of genetic capabilities

In previous developments, we explored the neuroscientific foundations, the neuroscience of learning, and saw how much the social environment influences and must be taken into account when evaluating the development of human skills and competencies. In fact, innate capacities such as thinking, language, feeling, (...) can be acquired and consolidate others, and these competencies can be shaped and influenced by the environmental component.

The evolution of humankind throughout the centuries has always made evident the social character of this development and how the context of survival fostered human structures and adaptation. Regarding the conception of the natural character of sociability, as different positions diverged, and with the discoveries of science over time, the philosophical debate deepened. Thus, as in the case of cognitive ability, we can observe, for example, that:

The empiricist tradition exemplified by Helvetius, an eminent Enlightenment philosopher and early Lamarckian, and rooted in the treatises of Aristotle and Locke, remains popular in the field of social sciences and among readers of Jean-Jacques Rousseau. It even frequently appears as politically correct, suggesting the absence of individual differences and the omnipotence of global and universal learning. On the opposite side, starting with Plato and Descartes, nativist theses constantly resurface, under the pen of Anglo-Saxon philosophers, linguists, or geneticists, and even in politics.^{2xvi} According to Matos,²⁴ the construction of the human being is a larger historical project, inherent to their life project. For this author, precisely this philosophical vision of the human being, expressing one's being in diverse ways, is what makes them unique and is their richness. For Matos,²⁴ the possibility of expressing oneself to the world and to others as different, with the elements peculiar to their personality, life history, material and existential reality, seeks to build their unity.^{xvii} We can understand interactionism and socio-historical-

^{xvi}To delve deeper into Helvétios's perspective on this topic, with the continuation of the author's explanation: DEHAENE and SCLIAR-CABRAL,² idem: DEHAENE, Stanislas; SCLIAR-CABRAL,² Leonor. The Neurons of Reading: How Science Explains Our Ability to Read.

^{xvii}Considering what such a claim to unity might mean, we turn to Ricoeur, who presents us with four fundamental tasks. The first of these is linked to the idea of “truth, which he calls “formal unity”; it “prescribes only the task of unifying all domains of existence-thought, action, human experiences-without, on the other hand, providing the intuition that would fill this empty form.” Given the lack of an intuition that shows us “materially” the unity of truth, we are compelled to two types of concrete unity. “Worldly unity,” which refers to the relationships and meanings that we historically attribute to our concrete world, and “existential unity,” which signifies overcoming the division of life itself. He calls the final unity “unity.” “Eschatological.” This “means first and

cultural psychology, already mentioned in the theories of Vygotsky and Piaget, as epistemological foundation.^{xviii} Regarding the relationship between cognition and social environment, we also have other solid foundations for understanding in psychology and phenomenology. Several theorists have stood out in the study of development, such as Freud in his psychosexual theory, moving through psychosocial theories like E. Erikson, and arriving at humanistic theories with C. Rogers. All these theories had philosophical bases and, within psychology, were developed over time. In the studies mentioned, each psychology theorist interpreted development as always progressing in relation to the environment. Thus, in the latency phase of Freud's psychosexual theory...^{xix}, such as psychosocial theories, with an emphasis on E. Erikson, as well as humanistic theories.^{xx} with A. Maslow and C. Rogers^{xxi} And the Cognitive theories of Piaget and Vygotsky, which state that relationships are the determining factor for development, both in terms of affective and interpersonal aspects, and in the human being's experience with the object of knowledge in the environment, that is, the context in which they find themselves.

Building identity is another way of talking about the realization of cognitive skills, of learning with psychosocial meaning. Human beings manifest their relational being, their "being in the world," or as Freud would say...^{xxii} realizes its egoic ideal, in the concretization of the social self. While for Freud the unconscious is structured according to affective changes, for example, repression, for Piaget there is an unconscious cognition that does not stem solely from affective transformations.^{xxiii} Being in the world is "being a being" (intentional redundancy) of relationships. This is because it is through living in social groups that humans create objects by transforming nature, and it is in social interaction that they create tools and learn to adapt to the environment in order to satisfy their needs.¹ Those who teach should always prioritize experiential learning. The notion of "being-in-the world," which comes from phenomenological philosophy officially initiated by Edmund Husserl, can be useful for understanding the interaction of the teaching-learning process. Edmund Husserl left the field of exact sciences and, enthusiastic about philosophy and the knowledge of "intentionality of consciousness" of Franz Brentano.^{xxiv} In his existentialist phenomenology, Husserl formulated the concept of intentional acts of consciousness in relation to the world. He developed what he called the phenomenological act of reduction, thus allowing us to see phenomena as they appear in the world.^{xxv} Philosophy primarily helps us learn to question the

assumptions of knowledge, the causes, the whys and consequences of events, and thus reinstates the place of doubt in society. As Merleau-Ponty tells us: "to philosophize is to affirm that there is something to see and to say." In philosophizing, we return to, and defend, one tradition or another. The author says that we do not learn about objects through the characteristics of the objects themselves, but invest our intentionality in what is offered to us by experience. In this sense, we can recall what we discussed earlier about phenomenology and the intentionality of consciousness in Franz Brentano. That is, there is an interaction between object and intentionality of consciousness through experience.²⁵ This means that it is not only cognitive abilities or genetics, but experience and the intentionality inherent in perception. From a neuroscience perspective, perception is the ability to link the senses to others. Aspects of existence, memory, and thought, and cognition, contribute to the formation of concepts about the world.²⁶ In this way, the idea of perception as a passive process is discarded by the neuroscience of learning. Thus, the "I can" of the philosophical concept replaces Descartes' "I think." This means there is a constant bodily "dialogue" with the world, a constant interaction.^{26,27} What neuroscience research teaches us is that "although learning occurs in the brain, it is not always the cause of the observed difficulties, as the environment actually leads to adaptive behaviors." The psychology of learning takes this cognitive adaptation into account. The environment to which we are exposed influences the learning process, interfering with psychological and emotional factors and inducing behaviors that may or may not be favorable to learning.⁴

Current studies have already confirmed that the development of written language depends on adequate cognitive aspects, favorable genetic predisposition, and rich environmental stimulation.⁸ Genetics makes a contribution that varies according to the environment, that is, the person's context, and therefore cannot be considered determinant for evaluating cognitive intelligence abilities. Philosophy and psychology become epistemological bases for understanding the development of cognitive abilities. Developmental psychology complements studies of human genetics. Our brain adapts to the cultural environment, and the context, along with culture, becomes the pedagogical means of cognitive development.² According to this author: The role of psychology is to investigate the changes that occur in the processes involved in the individual's relationship with the world, analyzing the basic mechanisms. To carry out its purpose, psychology interacts with other sciences such as medicine, philosophy, genetics, biology, anthropology, and sociology, as well as pedagogy, since these are branches of knowledge that are intertwined to explain human development.¹ Finally, the contribution of Damásio²⁸ confirms that there seems to be a constant interaction between social and neurochemical processes. In this sense, there is a relationship between chemical substances and emotions, showing a connection between thoughts, emotions and physiological signals, in such a way that the mind is integrated into existence, not allowing separation between mind and body, without forgetting the social insertion of this body.²⁹⁻³²

Conclusion

We can conclude, through the analyses presented, that people who demonstrate low cognitive development may be suffering negative interventions from their socioeconomic environment. Thus, we reflect that social vulnerability has been shown, within the field of neuroscience, to influence individuals' learning capacity, since there is an interaction with the environment for the process of consolidating skills and competencies, which result in the knowledge that has been acquired. Based on the ideas of Vygotsky, Piaget, and we suggest: Ariane P. Ewald. Phenomenology and Existentialism: articulating connections, stitching together meanings. 2020.

foremost that unity has not yet come, that any other unity is premature and violent; it means above all that history is still open, that multiplicity is still under debate."

^{xviii}Cf. Bibliography DUARTE N.²⁸ School education, theory of everyday life and Vygotsky's school. São Paulo, Autores Associados, 98 p.

^{xix}Besides Freud's Complete Works, there are many sources and websites dedicated to the master of psychoanalysis. A basic source for understanding psychosexual theory can be.

^{xx} A good summary of humanist theories and their creators.

^{xxi}Another important relationship for understanding human development involves the connection between psychoanalysis and psychology, with Freud and Rogers. We recommend the article by Sonia Maria de G.

^{xxii}Regarding the ego ideal, we can delve deeper into these concepts in: Moura, Joviane Aparecida de. Winnicott - Main Concepts. Psychologized. Edition 08/2008. The article "The Superego and the Ego Ideal: a Destiny for Family Romance" is also suggested. 2020.

^{xxiii}A resource for understanding Freud's relationship with Piaget regarding human development, the article from the Espaço Acadêmico Journal: Piaget and Freud: psychoanalytic facets of cognition. 2020.

^{xxiv}Regarding Brentano's notion of the intentionality of consciousness, which influenced Husserl's thought, we recommend the following article: In addition to its evident and explicit contribution in 2020.

^{xxv}To delve deeper into the concepts of existentialism and phenomenology,

Freire, we reflect that interaction is necessary between the biological and the physical,³³⁻³⁷ between genetics and epigenetics,^{xxvi} between neuroscience and the teaching/ learning process. We also want to highlight the influence of emotions on cognitive processes.^{xxvii} That The inclusion was made because a person's social reality, the context in which they survive, inspires their daily emotions, and this emotional process is intrinsically related to various pathologies.³⁸ However, the broad field of emotions demands future work. One of the main conclusions we reached is that there are possibilities and means to develop cognitive skills in children, young people, and even adults, whose development has been compromised by a lack of, or as a consequence of, interaction with the environment. This fosters neural maturation and plasticity. However, the school remains the most appropriate institution to promote the recovery of cognitive skills through inclusive educational practices.³⁹ We believe that the objective of this work was achieved, as the reflection on the perspectives presented allowed us to clarify how the social environment influences and manifests itself in the individual, with effects that may or may not develop their cognition, and the intrinsic relationship with the environment to explain the impairment of skills when, due to low economic income, resources are limited for the development of better performance. An individual may demonstrate, through their behavior and learning process, a relationship with mechanisms linked to producing or repeating content, but without thereby acquiring the necessary knowledge and understanding. This, as we have seen, is due to pedagogical models that are disconnected from the subject's reality and which, therefore, end up further alienating the person, not favoring their development as a full citizen. We can affirm that the individual demonstrates in their behavior and learning development a relationship with mechanisms that are linked to their production. Therefore, interactionism shows that an individual with low cognitive ability is not to blame for suffering due to their socioeconomic environment, as they are part of it and unjustly suffer its influence. Provide the individual with the necessary resources, and their abilities and skills will develop naturally.^{40,41}

Through bibliographic research and the social, educational, and economic data collected, we have found an essential relationship between socioeconomic reality and the development of individuals' innate abilities, as well as the consolidation of acquired skills and abilities. Therefore, any and all exclusion based on alleged cognitive incapacity or processes that could generate exclusionary actions of such magnitude are unacceptable, since the source and cause of exclusion lies in the individual's environment or context, and they cannot suffer for what was not offered to them, that is, the means for their development. We dare to dream of equal opportunities, because without them inequalities tend to increase and persist, potentially further affecting human development. We conclude this work with the hope of having contributed to this theme, which should always be explored in greater depth, thus revealing the intrinsic relationship between the development of cognitive abilities and interaction with the social environment.

^{xxvi}Epigenetics deals with the external influence on gene reproduction. It is the area of biology that studies changes in the functioning of a gene that are not caused by changes in the sequence of DNA and that perpetuate themselves in cell divisions, meiotic/mitotic. It is termed an epigenetic trait when the phenotype. It is caused by such changes. However, the term was originally coined by Waddington in 1942. and it referred to studies on the causal interactions between genes and their respective products that lead to the phenotype over the years.

^{xxvii}There are many sources and studies on the subject. One suggestion is the article "The influence of positive and negative emotional states on cognitive processing" 2020.

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Conflicts of interest

The authors declares that there are no conflicts of interest.

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