From Mechanistic Materialism Epistemology to Constructivist Epistemology: Reconstruction of Educational Perspectives

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Abstract:

Knowledge is the core of education, and different epistemological perspectives have significant implications for educational frameworks. In China, two major perspectives that have influenced education are mechanistic materialism epistemology and constructivist epistemology. The former asserts that knowledge originates solely from object stimuli on subjects, thereby possessing objectivity, purity, uniqueness, and truth. The latter argues that knowledge emerges from the interaction between subjects and objects mediated by activities (practice), with subjects playing a decisive role in the process of understanding. Thus, knowledge not only has objectivity but also subjectivity and contextuality. It is acquired and innate, individual and social, relative and absolute. The subversion of mechanistic materialism epistemology by constructivist epistemology has led to the reconstruction of educational perspectives, providing significant impetus for educational reforms, particularly in innovative education.

Keywords: Constructivism, Mechanistic Materialism, Epistemology, Educational Perspectives

1. Introduction

Knowledge is the core content of education, and education has always revolved around knowledge since its inception. The concept of an epistemological perspective refers to people's viewpoints and beliefs about knowledge, including what knowledge is, how it is generated, and its characteristics. Different perspectives on knowledge lead to divergent epistemological views, which in turn have significant implications for education. What is knowledge? Knowledge is the understanding that individuals have about the objective world. This objective world encompasses both the natural environment and human society, including human beings themselves (both as physical entities and as cognitive beings). Knowledge encompasses the recognition and experience of these objective entities, as well as the various theoretical frameworks and cultural phenomena that emerge based on such recognition and experience.

How is knowledge generated? Knowledge is generated through individuals' understanding of objective phenomena. Now, what exactly is "understanding"? While it is relatively easier to comprehend and grasp the concept of knowledge, explaining and comprehending "understanding" itself is challenging. It is precisely because there are different understandings of "understanding" and diverse interpretations of the nature of knowledge that divergent epistemological perspectives arise. In the context of China, two main epistemological perspectives have significantly influenced education: mechanistic materialism epistemology...
and constructivist epistemology. Due to the substantial differences between the two, the latter has to a large extent subverted the former, resulting in the reconstruction of educational perspectives[1].

2. Epistemological Perspective of Mechanistic Materialism and Its Impact on Educational Perspectives

2.1 Mechanistic Materialism Epistemology

Mechanistic materialism epistemology, also known as old materialism epistemology or mechanistic reflection theory, posits that the origin of the world is based on matter. This perspective holds that everything in the world, including human beings themselves, is composed of material substance and exists independently of human consciousness, unaffected by human will. The movement, development, and changes in the world (including human sensations, thoughts, and other conscious activities) are also governed by natural mechanical laws. According to mechanistic materialism, human understanding of the external world primarily stems from sensory stimulation received by the human senses (such as sight, hearing, smell, touch), which elicits various sensations. These sensations are transmitted through the nerves to the brain, where they are synthesized to form human understanding (knowledge) of the external world. From the perspective of mechanistic materialists, cognition is an objective activity perceived subjectively.

Objectively speaking, mechanistic materialism epistemology does provide some insights into how human cognition (knowledge) is generated. However, its understanding of the process of cognition (knowledge generation) is highly one-sided. It only highlights the significant role of the object of cognition, i.e., the external world, in the process of human understanding, "to the extent that, as traditional empiricism assumes, the subject is taught by things external to him" [2]. It completely or significantly overlooks the role played by the subject in the process of cognition.

According to mechanistic materialism epistemology, cognition, as Aristotle's "wax tablet theory" suggests, originates from sensation, which leaves imprints on the soul-like wax block [2]. This can also be compared to a mirror or a camera reflecting external phenomena. As a result, mechanistic materialism epistemology essentially equates human understanding of the natural world with the passive, instinctual, and adaptive reflections of ordinary animals or external objects upon the natural world [1].

2.2 Mechanistic Materialism Epistemological Perspective

The mechanistic materialism epistemological perspective is determined by mechanistic materialism theory and exhibits the following characteristics:

First, it considers knowledge to be solely derived from the stimulation of the objective world or external objects on the human nervous system. The subjectivity, initiative, and agency of individuals as knowers are completely ignored or greatly diminished. According to this perspective, knowledge is acquired passively rather than actively. The knowledge obtained, lacking the organization, induction, and processing by the knowing subject, appears primitive, fragmented, and rudimentary. It lacks generality, connectivity, systematicity, logic, universality, and necessity, making it difficult to qualify as rigorous knowledge. Furthermore, the acquisition of knowledge, devoid of alignment with the knowing subject's purposive needs, weakens the significance and role of cognition (knowledge) for the knowing subject and for individuals in general.

Second, it posits that knowledge is a rigid reflection of the external world in the human brain. The external world is regarded as objective and independent of human will. Consequently, knowledge is also considered objective and independent of human will, possessing an objective reality. The objective reality of knowledge implies that, similar to the material world it reflects, knowledge exists concretely regardless of whether one is
conscious of it or has preferences for or against it. It does not cease to exist because humans are unaware of it or dislike it. The objects and laws it reflects are not influenced by human will. They cannot be changed simply by wishing to do so, but rather continue to operate according to their inherent laws. This epistemological perspective separates knowledge from human beings, weakens humanity's understanding of the world, and diminishes the agency of acquiring and utilizing knowledge.

Third, proponents of mechanistic materialism believe that since knowledge is considered a mirror-like reflection of the objective world, when faced with the unique objective world and similar or identical objects, whether it be person A, B, or C, knowledge of the external world or the objects of cognition should be unique or similar without qualitative differences. Only when the world and its constituent objects undergo qualitative changes will people's knowledge correspondingly change, leading to the formation of new knowledge. Once new knowledge is formed, it also possesses uniqueness and exclusivity. Moreover, since it becomes knowledge, it should be consistent and enduring, unaffected by time, place, or individuals. From the perspective of mechanistic materialism, knowledge is considered the correct reflection of objective phenomena by subjective cognition. Therefore, knowledge is deemed absolutely correct, transcending time and space, pure and pure, devoid of any limitations, and free from any errors, equivalent to truth.

2.3 Education Perspective of Mechanistic Materialism

The education perspective of mechanistic materialism is built upon and constrained by the epistemological perspective of mechanistic materialism. For a long time, this perspective has had a significant impact on educational activities both domestically and internationally, particularly in China.

2.3.1 Key Features

The education perspective of mechanistic materialism is characterized by three key features:

Firstly, education is viewed as a process of pure knowledge transmission and acquisition. The process of acquiring knowledge, is not considered an active process of participation, discovery, construction, and creation by the individual. Instead, it is viewed as a rigid and passive process. The cognitive structures or frameworks, paradigms, and subjective experiences that individuals build upon existing knowledge are often overlooked, resulting in a simplistic educational process.

Secondly, teachers are considered the masters of the classroom. Due to the alienation and estrangement between individuals and knowledge caused by the epistemological perspective of mechanistic materialism, knowledge is often perceived as sacred and absolute truth that cannot be questioned or altered. Textbooks and teachers become the embodiment of knowledge and truth, with teachers being the masters of education and students becoming objects manipulated by teachers. This approach suppresses students' autonomy, initiative, enthusiasm, and creativity.

Thirdly, there is an emphasis on collectivism over individualism and results over the process. While education under the dominance of the epistemological perspective of mechanistic materialism also emphasizes individualized instruction, it is limited by this perspective, resulting in limited understanding and approaches to individualized instruction. Teaching often relies on teachers lecturing and students listening, teachers writing and students memorizing. Exploratory and interactive teaching methods are used less frequently, and there is minimal in-depth analysis of students' individual characteristics, interests, and strengths to tailor instruction accordingly. Teachers, schools, educational authorities, and society place greater importance on students’ results rather than the learning process. Examination scores, pass rates, graduation rates, enrollment rates, and employment rates are often prioritized over students’ actual understanding of concepts, principles, and mastery of systematic knowledge and correct thinking methods. This is due to an education system dominated by the epistemological perspective of mechanistic materialism.
Fourthly, there is the focus for theory over practice, knowledge over abilities, and specialization over culture. The majority of teaching time and effort is dedicated to the imparting of theoretical knowledge in the field of specialization, while practical aspects, particularly experimentation, internships, social practices, as well as moral, academic ethics, and cultural literacy, are often neglected.

Fifthly, there is a pursuit of objectivity, purity, and truth in knowledge, which leads to a neglect of the subjectivity, contextual nature, relativity, diversity, social dimension of knowledge, and its significance for individual learners. The emphasis is on the objectivity, purity, and truth of knowledge, and on standardized and singular answers. This undermines the cultivation of students' autonomous learning, creativity, innovation, as well as their individuality, emotions, and psychological well-being.

Lastly, there is a tendency to adopt a binary approach to evaluation, results-oriented evaluation, and single-dimensional evaluation. This evaluation often overlooks process evaluation, diverse evaluation approaches, and neutral evaluation, appearing simplistic and crude. As a result, it becomes challenging to provide objective, scientific, and comprehensive evaluations of students' learning conditions, particularly their learning abilities. Moreover, the evaluation process often leads to a deviation in educational values and harms students' autonomous learning, self-confidence, and motivation.

3. Constructivist Epistemology: Epistemological Perspective and Reconstruction of Educational Views

3.1 Constructivist Epistemology

Constructivism originated in the 1970s and 1980s in the United States and Europe and is widely recognized as a new educational theory or philosophy. It is based on post-Kantian modern epistemology and has notable proponents such as Kant, Piaget, Vygotsky, and Kuhn.

3.1.1 Kant's Modern Epistemology

Kant argued that the objective world as a thing-in-itself is beyond human perception. What humans perceive are merely the appearances of this objective world. Humans possess not only sensory perception but also intellect and reason. Similar to the perspective of mechanistic materialism, Kant recognized sensory perception as the source of human understanding. In the introduction to his work "Critique of Pure Reason," Kant stated, "All our knowledge begins with experience, but it does not follow that it all arises out of experience" [4]. However, Kant also believed that sensory perception alone is insufficient to constitute knowledge. Sensory perception often consists of a disorganized assortment of sensations [5] and cannot be considered knowledge. To transform sensory perception into genuine knowledge, the knowing subject must possess innate cognitive forms, namely, intellect (or a priori synthetic judgment ability), which allows them to process and organize sensory materials. Because the cognitive forms represented by intellect exist prior to and as conditions for sensory perception (experience), sensory materials processed by intellect possess an innate or universal necessity, thus becoming scientific knowledge. It is evident that Kant not only emphasized the significant role of sensory perception (experience) in human understanding of the objective world but also highlighted the role of the knowing subject's intellect in the process of cognition. It is through the organization and processing of sensory perception by intellect that sensory perception can elevate to scientific knowledge with universal necessity. Kant's groundbreaking significance in modern epistemology lies in his emphasis on the determining role of the knowing subject in the process of cognition. It is not that "all our knowledge must conform to objects," but rather "that objects must conform to our knowledge" 2.

In other words, Kant proposed that human knowledge does not align with the objects of nature, but rather 'human reason legislates for nature.' This suggests that the mission of cognition is not merely to passively reflect the world but to actively interpret the world, thus achieving what can be called a "Copernican revolution" in epistemology. While Kant made a leap from mechanistic materialist epistemology to modern epistemology, he did not explain the origins of human intellect, innate synthetic judgment abilities, and the
like. He could only attribute them to innate endowments, thus falling into the quagmire of subjective idealism.

3.1.2 Piaget's Constructivist Epistemology

Swiss psychologist Jean Piaget conducted in-depth research on this topic and established the theory of "genetic epistemology." Genetic epistemology refers to the study of the origin and development of knowledge.

3.1.2.1 According to Piaget's Constructivist theory

The mediation or structure of human cognition originates from activity. Piaget believed that at the beginning of human development, "knowledge does not arise from a subject with self-consciousness, nor does it arise from an object that has already formed and imprinted itself on the subject. Knowledge arises from the interaction between the subject and the object, which occurs midway between the subject and the object..." Therefore, the primary issue regarding cognition is establishing the mediating entities between the subject and the object. Piaget stated, "These mediating entities begin at the point of contact between the body itself and external objects, and they develop in two directions provided by the external and internal stimuli... The initial mediators are not perceptions but activities that are much more plastic." This view aligns closely with Marx's perspective that practice creates the subject of knowledge.

Cognitive structures occur and develop through the reciprocal interaction between organisms and their environment. Piaget argued that to study genetic epistemology as a natural person, one must consider epistemological issues from a biological perspective. According to his view, the development of organisms is a process of interaction between the activities of individual organization and environmental adaptation, that is, the process of interaction between internal and external activities. The internal activities of organisms refer to the cognitive subject's contact with the external world through various activities, being stimulated by the external environment, and gradually establishing and strengthening perceptual mechanisms for the external world within themselves. Piaget referred to this perceptual mechanism as the "mediating entity" between the subject and the object, similar (though not entirely equivalent) to Kant's "intellect." This mediating entity serves as a bridge connecting the subject and the object and as a tool for the cognitive subject to continually understand the object and the external world while improving itself to possess more powerful cognitive abilities. Such perceptual mechanisms are referred to as "schemas" in genetic epistemology. How do schemas function in the process of cognition? When the cognitive subject comes into contact with the external world and receives external stimuli, it assimilates them into its existing schemas, which is referred to as "assimilation." Assimilation does not lead to structural changes in the existing schemas but consolidates and strengthens them. The only factor that causes a structural change in schemas is "accommodation," which refers to the process in which the cognitive subject is unable to assimilate the information resulting from stimuli or environmental influences, leading to and promoting structural changes in the existing schemas to adapt to the external environment. Accommodation not only adjusts and changes the existing schemas but also differentiates them into multiple schemas, thereby transforming cognitive activities from singular cognition to the synergistic and complex activities of multiple schemas. As schemas continually expand, the cognitive structure of the subject becomes increasingly complex, strengthened, and improved, ultimately forming a cognitive structure with logical reasoning abilities, which is what Kant referred to as "intellect" and innate synthetic judgment capabilities.
3.1.3 Vygotsky's Social Constructivism

Vygotsky, a renowned Soviet psychologist, focused on the social-historical perspective of human psychology and epistemology, contrasting with the natural and biological approaches emphasized by Kant and Piaget, which aimed to explain higher mental processes from a brain-centered perspective. Vygotsky adhered to Marx's assertion that "the essence of humans is constituted by social relations" [7]. Thus, he pioneered a new dimension in the study of epistemology by investigating the formation of human psychology from a social-historical standpoint.

3.1.3.1 According to Vygotsky:

1. Humans are products of social-historical development and are the "sum total of all social relationships." Their psychological development and cognitive structures are inevitably influenced by social-historical and cultural factors.
2. From the perspective of psychological development, there are lower and higher mental functions. The former is a product of natural and genetic development, while the latter is a product of social-historical development, emerging and developing through interpersonal interactions. Higher mental functions are mediated by tools and symbols. Humans assign meaning to objects and the world through various symbols, and they infer, understand, and grasp the world based on these meanings. Language is a crucial tool that humans have developed and continuously updated throughout their extensive evolutionary process to organize and represent thoughts. Concepts, knowledge, and logic are all constructed and represented through this tool.

Human psychology develops through activities (practice). "Changes in a person's psychological processes are synchronized with changes in their practical activities" [8], revealing the significant role of activities (practice) in the formation of higher mental functions and the unity of consciousness and activity. Activities (practice) serve as the externalization or objective manifestation of consciousness, while at the same time, practice reinforces human consciousness.

Zone of proximal development (ZPD). It refers to the difference between a child's actual intellectual level and the level they can reach when solving problems with assistance [9].

3.1.4 Kuhn's Theory of Scientific Revolutions

Thomas Kuhn, an American historian of science, conducted research that revealed how scientists conduct their work, understand their subjects of study, acquire knowledge, and achieve revolutionary research breakthroughs. In essence, Kuhn meticulously outlined the "structure of scientific revolutions." His contributions not only demystified the process of scientific research but also deepened and enriched the theoretical implications and case studies of modern epistemology.

3.1.4.1 Key Points

**Kuhn's theory of scientific revolutions encompasses the following key points:**

Normal Science: Scientists typically engage in "normal science," which refers to research firmly established on the foundation of past scientific achievements. This research serves as the basis for further practices within a scientific community for a given period of time.

Scientific Community: A scientific community consists of professionals within the same disciplinary field who have undergone similar education, training, and have studied the same technical literature, gaining similar benefits from it. A scientific community is formed by individuals who share a common paradigm.
Paradigm: In Kuhn's theoretical framework, paradigms complement the scientific community. Paradigms have a dual meaning: they represent the beliefs, values, techniques, and research questions shared by members of a specific community, and they serve as specific "puzzle solutions" that function as models and examples, replacing explicit rules as the foundation for solving other puzzles within normal science.

Incommensurability: Different paradigms and scientific communities exhibit "incommensurability," making it difficult to communicate, exchange ideas, and establish mutual understanding. Incommensurability refers to the lack of common measures or shared criteria for evaluating theories between different paradigms or scientific communities.

Scientific Revolutions: Scientific progress and development do not always occur in a linear and cumulative manner, as commonly believed. They often involve the appearance of anomalies within normal scientific research. As these anomalies accumulate, paradigms face crises in which they are unable to provide effective solutions. Similar to social crises that arise when old institutions and systems can no longer address recurring social conflicts, revolutions occur, replacing old paradigms with new ones. Scientific revolutions lead to ongoing research based on new paradigms.

Many groundbreaking advances in scientific history have been generated through this process. Consequently, the structure of human cognition is qualitatively transformed, and cognitive abilities are further enhanced. Regarding the perception of scientific theories' truthfulness, Kuhn repeatedly stated in his influential work, "The Structure of Scientific Revolutions," that he does not agree with the notion that there exists a "complete, objective, and true statement about the natural world." As a result, some people consider his views as endorsing subjectivity or even irrationality. Furthermore, he emphasized that there is no absolute right or wrong between different paradigms, particularly since the old paradigm is often a product of the historical context of its time, meeting the needs of human understanding of the objective world at that specific time. Even within the same era, "two groups supporting different theories may both be correct." Therefore, he is often cited by relativists as an ally. However, Kuhn himself disapproves of this characterization and even finds it distasteful. He holds his own perspective on truth, viewing it as both subjective and objective, while also encompassing diversity and sociability. Moreover, in specific eras and contexts, truth can be both absolute and relative.

3.2 Constructivist Epistemology

Constructivist epistemology is based on modern epistemological foundations and differs significantly from the mechanistic materialist view of knowledge.

3.2.1 Characteristics

It possesses several distinct characteristics:

Firstly, constructivist epistemology recognizes the importance of sensory perception in the process of human understanding of the objective world. However, sensory perception alone is insufficient to transform understanding into knowledge. In order for sensory perception to become knowledge, it must undergo processing and synthesis through human intellectual and innate judgment abilities.

Secondly, human intellect and innate judgment abilities are not bestowed by a divine entity but are developed through the interaction between the subject and the object through activities (practice). Furthermore, they play a decisive role in human cognition of the objective world.

Thirdly, when encountering new phenomena or acquiring new knowledge, individuals always rely on their existing knowledge, experiences, and subjective perceptions. They build upon their existing cognitive abilities to comprehend new things, discover new patterns, and grasp new knowledge. Simultaneously, in this process,
they further strengthen and refine their cognitive structures, enhancing their cognitive abilities. Additionally, when the existing cognitive structure fails to understand new phenomena or explain new things, the previous knowledge structure undergoes partial or complete deconstruction and collapse until a new cognitive structure is reconstructed.

Fourthly, human higher mental functions (including cognitive abilities) are mediated by symbols and tools. Humans assign meaning to objects through various symbols and interact with the external world through them, deepening their understanding of the external world. Language is a crucial tool unique to human society, embodying various concepts, perspectives, thoughts, and logic. Language not only facilitates learning and mastery of knowledge, organizing and promoting the development of thoughts, social interaction, and the exchange of ideas and culture but also serves as a tool for self-regulation and reflection. Therefore, symbols and language are of utmost significance in human understanding of objects, the world, knowledge acquisition, and the enhancement of cognitive abilities.

Fifthly, compared to the mechanistic materialist view of knowledge, constructivist epistemology provides a more comprehensive, profound, and scientific understanding of the nature of knowledge. Constructivist epistemology maintains that knowledge is not only objective but also subjective and contextual. It is both acquired and innate, individual and social, relative and absolute.

The objectivity of knowledge indicates that knowledge originates from the objective world and represents human understanding of the objective world, subject to the constraints of the objective world. The subjectivity of knowledge implies that human understanding of the objective world is not passive but conscious, purposeful, and active. Furthermore, sensory knowledge obtained from external sources can only become rational knowledge with universal necessity through the subject's organization, processing, and synthesis. Knowledge has a contextual nature, as it arises within specific social, historical, and cultural environments. For example, Euclidean geometry is a product of ancient Greek society, while classical physics, represented by Newtonian mechanics, emerged from Western society in the late 17th to early 20th centuries. In contrast, theories like the theory of relativity, quantum mechanics, and the law of parity non-conservation are products of modern society in the 20th century.

Knowledge is acquired, indicating that it relies on objects, sensory stimuli, and human sensory experience. Sensory experience is the source of all knowledge. However, knowledge is also innate, as its formation relies on the subject's intellectual capacity (innate judgment abilities). The subject's intellectual capacity or innate judgment abilities exist prior to sensory experience and serve as the conditions for the occurrence of sensory experience. In other words, if humans do not possess at least basic cognitive abilities, sensory experience will not occur, let alone the generation of systematic and theoretical knowledge.

Knowledge is both individual and social. It is obtained and developed by individuals through cognitive activities. Society provides individuals with a rich and diverse cognitive environment, including cultural heritage, accumulated knowledge, educational institutions, and social interactions. Through social interaction, individuals can learn from each other, mutually stimulate and promote cognitive development, and collectively construct knowledge.

Knowledge is relative and absolute. On the one hand, knowledge is relative, as it is influenced by individual cognitive structures, subjectivity, historical and cultural backgrounds, and social context. Different individuals, due to differences in cognitive structures, subjectivity, and historical and cultural backgrounds, may have different understandings and interpretations of the same objective world, resulting in diverse forms.
of knowledge. On the other hand, knowledge is absolute, as it objectively reflects the objective world and follows objective laws. The objective laws that knowledge follows do not depend on individual will or desire but exist independently of individual consciousness. Objective laws can only be discovered, understood, and followed by humans through active and conscious cognitive activities.

In conclusion, constructivist epistemology challenges the mechanistic materialist view of knowledge. It emphasizes the active role of individuals in constructing knowledge, the influence of cognitive processes, and the importance of context and social interaction. Constructivist epistemology provides a more comprehensive understanding of the nature of knowledge, recognizing its objectivity, subjectivity, contextuality, acquisition, innateness, individuality, sociability, relativity, and absoluteness.

3.3 Reconstruction of the educational view by the constructivist epistemology of knowledge

3.3.1 Reconstruction of the educational perspective

The reconstruction of the educational perspective through constructivist epistemology of knowledge is primarily demonstrated in the following aspects:

Firstly, the cognitive subject plays a crucial role in the educational process. According to constructivist epistemology, understanding the world is not a passive reception but an active engagement with the external world through activities and interactions. In this process, the cognitive subject's existing knowledge, experience, and subjective perceptions, known as cognitive structures, play a decisive role. Understanding objective things and the world, acquiring, mastering, and creating knowledge is essentially a process of improving one's cognitive structure, enhancing cognitive abilities, attributing meaning to the external world, and self-construction. Therefore, it is necessary to establish a human-centered and student-centered approach in the educational process, fully stimulating students' learning interests and intrinsic motivation, promoting their self-directed learning, independent exploration, self-construction, and self-realization.

Secondly, the reconstruction of the teacher-student relationship in the classroom is characterized by "student-centeredness" and "teacher guidance." "Student-centeredness" refers to the full realization of students' autonomy in learning, self-improvement of their cognitive structures, better knowledge construction, deep understanding and grasp of the world, and the realization of their own value. "Teacher guidance" means that teachers organize, guide, support, assist, and supervise students' learning to ensure that teaching activities proceed normally, systematically, efficiently, and with quality. In the specific teaching process, it is important to strike a balance between the roles of "students" and "teachers" and avoid extremes. The relationship, magnitude, importance, and impact of the roles of "students" and "teachers" in the classroom are not fixed but inversely proportional and should be adjusted according to the actual situation. The larger the role of the "students," the smaller the role of "teachers," and vice versa. The value orientation should focus on the role played by the "students" in the classroom teaching process, which is determined by the constructivist epistemology. At the same time, it aligns with an old Chinese saying: "Teaching is for not teaching" - the ultimate goal of education is to empower students to free themselves from dependence on teachers and acquire independent self-learning and self-construction abilities.

Thirdly, constructivist epistemology emphasizes personalized development and individualized instruction. According to the constructivist view, knowledge is acquired through self-construction by the cognitive subject. Since cognitive subjects have different experiences and cognitive structures, as well as varying ways and processes of acquiring knowledge, it is neither possible nor desirable to cultivate them in a standardized manner. Instead, differentiated instruction should be provided based on respecting their individual
characteristics, interests, cognitive abilities, and talents, as well as incorporating their unique life experiences. The knowledge acquired through personalized thinking and unique approaches by students, although having commonalities, differs in the process of acquisition, understanding, and interpretation. It also possesses creativity and innovation, making it their "own knowledge." The process of acquiring knowledge is, in fact, a manifestation of self-ability and self-value realization.

Fourthly, there is a focus on valuing students' developmental potential. Vygotsky's concept of the "zone of proximal development" reminds teachers that all students have the potential for development, and one of the most important purposes of education is to continuously tap into students' developmental potential. It can be said that Vygotsky's concept of the zone of proximal development aligns with Piaget's theory of "scaffolding." To tap into students' potential, education must stay ahead of students' actual developmental level to regulate their cognitive patterns. Of course, leading education ahead of students' actual development is not about forcing premature growth but rather delineating a specific zone, which is the zone of proximal development. Education within this zone is most conducive to facilitating students' growth. One of the primary tasks of teachers is to identify students' zone of proximal development. Additionally, the concept of the zone of proximal development also reveals that to fully tap into students' potential, it is necessary to seek assistance from teachers, peers, and others. Therefore, students should learn to seek help from and collaborate with teachers, peers, and others, while teachers and peers should actively provide various forms of assistance to students and peers. Through mutual support and the realization of individual potential, collective growth can be achieved.

Fifthly, activities and practices play an indispensable role in the process of knowledge acquisition. The process of cognition is the result of the cognitive subject's interaction with the external world through activities and practices. Activities and practices serve as the medium and bridge between individuals and the external world. Through various activities such as interaction, communication, collaboration, experiments, and practical experiences, close connections are established between individuals, between individuals and nature, allowing for self-understanding, understanding of human society, and understanding of the natural world. Moreover, these activities further enhance individuals' capabilities for action and cognition.

Sixthly, the context holds significant importance in the process of knowledge construction. The constructivist epistemology teaches us that that knowledge is contextual, being a product of specific historical, social, and cultural backgrounds. It emerges within particular environments. Without specific contextual knowledge, knowledge cannot be generated, and it does not possess universal or necessary truth. Therefore, in practical educational processes, the traditional approach of neglecting the context and merely transmitting knowledge needs to be changed. It is essential to create corresponding contexts as much as possible, integrating knowledge with its originating contexts. This way, the knowledge acquired by students becomes meaningful and vital, enabling them to solve real-world problems and enhance their abilities to address practical issues.

Seventhly, emphasis is placed on the significant role of symbols and language in the educational process. Symbols and language not only serve as carriers of meaning and knowledge but also act as intermediaries for connecting and communicating with the internal and external world. They are tools for internal thinking and external expression. Therefore, in the educational process, it is crucial to recognize deeply the important role of symbols and language in constructing and refining one's cognitive structure. Students should be guided to accurately grasp the rich knowledge and meaning inherent in symbols and language and appreciate the internal logical relationships within symbols and language. Based on this foundation, a deeper exploration of the representational function of symbols and language should be conducted, endowing them with new implications and effectively enhancing students' cognitive and thinking abilities.
Eighthly, multiple assessments, neutral assessments, and process assessments must be implemented. Constructivist epistemology recognizes the complexity of things and the knowledge that reflects human understanding of the nature, laws, and relationships of things is also complex. It cannot be summarized by simple judgments of right or wrong. The concept of multiple assessments, neutral assessments, and process assessments takes into account the complexity and diversity of knowledge. It means that the focus of assessment should not be solely on the correctness of students' conclusions but rather on their thinking processes, methods, and efforts to arrive at those conclusions. The assessment process should become a reflection of students' thinking, helping them understand the key issues, identify the reasons behind problems, and avoid incorrect methods. Through assessment, students should be more focused on the process of learning and knowledge construction, rather than solely pursuing a supposedly correct answer or seeking affirmation and praise from the teacher. The purpose of assessment is not only to understand students' mastery of knowledge but, more importantly, to gain a deeper understanding of how students explore and acquire knowledge, thereby improving their abilities for autonomous learning and knowledge construction. It also aims to enhance students' interest, motivation, and self-confidence in learning, making learning a genuine process of acquiring knowledge, intellectual growth, physical and mental well-being, and self-improvement. The constructivist epistemology challenges the traditional mechanistic materialist view of knowledge and revolutionizes educational perspectives. This paradigm shift not only has practical significance but also profound historical implications. By embracing constructivism, we can optimize the educational ecosystem and encourage students' innovative qualities, allowing them to better realize their own values and develop comprehensively. Ultimately, this approach enhances their sense of achievement and well-being in the learning process, cultivating high-quality talents that can make a positive impact on society.

4. Conclusion

Constructivism has been recognized as the most subversive educational theory since its birth. Therefore, it has developed rapidly since its inception and has become a huge theoretical system involving a wide range of areas, intricate content, and diverse genres. However, in the study of constructivism, it is unavoidable that good and evil are mixed, even with obvious irrational tendencies, which have a negative impact on education. In response to this situation, this paper makes a more in-depth and detailed review of the modern epistemology, the philosophical foundation of constructivism, and interprets the knowledge view based on modern epistemology in a logical and dialectical manner, as well as its educational significance of constructivism. Systematic and innovative interpretations have been carried out in order to introduce constructivism research into a scientific and rational track, give full play to its ability to improve teaching relationships, optimize educational ecology, get rid of the shackles of exam-oriented and employment education, cultivate students' strong interest in learning, and promote their autonomy. Learning, independent exploration, self-construction, self-realization, improving mutual cooperation ability and practical ability, especially the important role of innovation, creativity and all-round development, better realize the powerful promotion of high-quality talents for the development of modern society effect.

In conclusion, it is important to recognize the active role of the cognitive subject, establishing a new teacher-student relationship, promoting personalized education, valuing students' developmental potential, emphasizing the role of activities and practices, and acknowledging the significance of context in knowledge construction. These perspectives contribute to a learner-centered, interactive, and meaningful educational approach that fosters students' autonomy, critical thinking, creativity, and self-realization.
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The author reports there are no competing interests to declare.

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I hereby declare that this manuscript is the result of my independent creation under the reviewer’s comments. Except for the quoted contents, this manuscript does not contain any research achievements that have been published or written by other individuals or groups. I am the only author of this manuscript. The legal responsibility of this statement shall be borne by me.

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