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The Possibility of Classroom Teaching: An Enactive Cognition Interpretation

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Abstract: High development of artificial intelligence technology is reshaping the education ecosystem. It poses severe challenges to traditional classroom teaching, which center on knowledge representation and knowledge transmission. In order to resolve the problem of meaning alienation in the technological age, this study grounds in enactive cognition and extracts its core insights such as the body-body problem, the problem of other minds, and the cognitive gap. By integrating Heidegger's idea of "readiness-to-hand" and "Being-with", this study argues that the essence of classroom teaching is an authentic practice where teachers and students, within a specific situation of "Being-in-the-world", jointly engage through interactive actions, mutually triggering and dynamically generating meaning. This study aims to clarify the question of how classroom teaching is possible through enactive cognition interpretation view.

1. Introduction

The rapid advance of artificial intelligence technology is profoundly influencing the education ecosystem [1,2]. There is common phenomenon that meaning alienation in the technological age. Traditional classroom teaching pedagogy takes the classroom teaching as a pipeline for knowledge-transmission: the teacher is the information source, the student the receiver, and technology is a mere amplifier. However, the metaphor of "representation-transmission" is suddenly failure and leaving an ever-widening meaning gap, when algorithm can instantly generate a personalized knowledge graph, and a large language model can replace part of the teacher's explanatory function with millisecond responses. What is the reason for teachers and students to gather in presence, if knowledge is already available at the click of a prompt? What is the ontological value of classroom as a unique "being-in-the-world" cannot be reduced to or replaced by technology? These inquiries are not only perplexities in educational practice, but also concerning how humanity can "dwell poetically" amidst the torrent of artificial intelligence.

Since 20th century, classroom teaching theory has witnessed and nourished by multiple disciplines such as philosophy, psychology, and sociology; with the emergence of dominant paradigms like behaviorism, cognitivism, and constructivism, explaining the mechanisms of classroom teaching from the dimensions of external stimuli, information processing, and meaning construction. In recent

years, with the rise of embodied cognition, enactivism, and situated learning theory, classroom teaching research has gradually transcended the one-way "transmission-reception" model, turning to focus on the fundamental role of the body, environment, and interaction in the formation of cognition [3]. However, most existing research is still from independent disciplinary perspectives, either focusing on improving the effectiveness of classroom teaching techniques, emphasizing the micro-analysis of teacher-student interaction, or being confined to the symbolic representation of curriculum content. Integrated interpretive framework has not yet been formed of multiple dimensions such as cognition, existence, and value. Various concepts and methods of classroom teaching are competed with each other and difficult to integrate, lacking unified response to the essence of classroom teaching and failing to address the predicament of suspended meaning in the technological age.

This study grounds in enactive cognition and extracts its core ideas such as the body-body problem, the problem of other minds, and the cognitive gap. By integrating Heidegger's ontological insights of "readiness-to-hand" and "Being-with", this study aims to clarify the theoretical question of how classroom teaching is possible. Opinion of the paper is that essence of classroom teaching is an authentic practice where teachers and students, within a specific situation of "Being-in-the-world", jointly engage through interactive actions, mutually triggering and dynamically enact meaning. Sense-making is not only the ontological purpose of classroom teaching but also is the ontological precondition of classroom teaching becomes possible. Therefore, this paper will proceed from the essence, valuableness, rationality, and possibility of classroom teaching, and argue for the logic of classroom teaching as an authentic practice. Analyzing how to take teacher-student "Being-with" as the core for participating in the opening situations and deepening cognition. Then it will benefit classroom teaching theory to promote its philosophical foundation, practical paths and evaluation mechanisms to be systematic reconstructed.

2. The Essence of Classroom Teaching: The Body-Body Problem and Dual Embodiment

Enactive cognition mentions that classroom teaching should not be simplified to an informational process of "teacher transmission-student reception", but should return to the primordial fact that "the body is in the world". It proposes the "body-body problem" to replace the traditional "mind-body problem". Cognitive activity involves two embodied dimensions: one is "living body" from the biological view, and the other is "lived body" from the phenomenological view [4]. A living being (living body and lived body) brings forth meaning through cognition [5]. Dual embodiment can resolve the origin of meaning.

The essence of classroom teaching is the process of meaning co-creation through the dual generating of these two bodies. The "living body" emphasis on the real-time coupling of the neuro-motor system with the environment. Some simple actions can continuously reshape brain activity patterns, such as students raising hands, manipulating teaching aids and shifting gaze. That cause concepts are not abstract symbols but become "ready-to-hand" tools. The focus of "lived body" is the pre-reflective temporal flow and affective field: when a student's heartbeat accelerates due to a question or breath is held in a moment of sudden enlightenments, meaning is not be understood but be "lived out". Classroom teaching allows each adjustment of the "living body" and each tremor of the "lived body" to resonate with each other, thus forming a unique cognitive event.

Heidegger used "readiness-to-hand" to describe the tools reveal themselves in practice: a hammer becomes a hammer only in the act of hammering [6]. Cognitive events become knowledge only when the student's "ready-to-hand" operation. Enactive cognition expands "readiness-to-hand" from an individual tool to the "extended body" co-constituted by teachers and students [7]. When the teacher's gestures, tone, blackboard rhythm, and the students' gaze, note-taking, and verbal responses form synchronized sensorimotor loops, their bodily boundaries temporarily blur, then a larger "we-body"

emerges. At that time concepts not belong to individuals but are continuously generated, modified, and enriched within this common body.

The essence of classroom teaching is not putting knowledge into minds but letting meaning generate in the interweaving of the dual bodies [8]. It not only necessitates the support of the "living body" through "external organs" like blackboards, lab equipment, and tablets, but also necessitates the attunement of the "lived body" through "affective rhythms" like suspense, humor, and astonishment. It requires teachers to design operable tasks while allowing students to follow their pre-reflective rhythm. At the moment of living-body's doing and the lived-body's feeling inter-animate each other, classroom transcend its role as a mere pipeline of information transmission and become an authentic event of "Being-in-the-world". Teachers and students together weave a new fold into the fabric of the cognitive world.

3. The Value of Classroom Teaching: The Dissolution of the Other Minds Problem and the Unfolding of Being-With

Traditional classroom teaching is permeated by an implicit and unspoken anxiety: how can the teacher access students' mind? Behind this anxiety lies the classic epistemological "other minds problem". Enactive cognition dissolves this anxiety through the second-person perspective and "participatory sense-making" [2]. That promotes the value of classroom teaching from knowledge acquisition towards the unfolding of meaning in "Being-with".

Enactive cognition opposes taking social cognition as a linear process of perceiving meaningless physical signals and then inferring the mental states behind them. At a pre-reflective level, enactive cognition directly takes "The Other" as a living and mindful "you" [7]. In the classroom, teachers see not "a sound-emitting object" but "eyes filled with perplexity" or "a suddenly lit-up expression"; students hear not "sound wave vibrations" but "a call that can be responded". This kind of direct perception is possible because the sensorimotor loops of teachers and students entangled interaction, forming a larger "autonomous cycle", that is the "extended body".

Heidegger proposes out: "Dasein" is essentially the "Being-with", the world is always that I share with others [6]. Heidegger establishes ontological status for this interaction with "Being-with". "Dasein" is never an isolated "I" but is "Being-with" others [4]. The classroom teaching situation is a typical field of "Being-with" structure: the blackboard, questions, tones, and silences constitute a "we-world". The meaning of concepts does not reside in some isolated mind but emerges when "we are collectively concerned with the problem". When a teacher slows down the speaking speed because of a student's furrowed brow, or students adjust their thinking because of the teacher's pause, they are not speculating each other's psychology but directly perceiving each other's intentions and emotions within the shared sensorimotor rhythm. Thus the "other minds problem" need not be solved through "simulation" or "theory inference", it is dissolved in the immediacy of interaction.

There is a new measurement of the value of classroom teaching. It not depends on whether the teacher accurately transmitted information, but depends on whether teachers and students jointly entered a perceptible meaning field. The success of a class is not all students arrive at the standard answer, but that "we" together let a certain question manifest itself in the world, and in this process of manifestation, mutually confirm: "we" exist together, think together, and generate together. The correctness of knowledge can be tested later, but the unfolding of "Being-with" is instantly realized the value of classroom teaching. It allows everyone to experience: my thinking is possible because of you and your world is enriched because of me. This experience is the most precious outcomes of education remaining after the dissolution of the "other minds problem".

4. The Rationality of Classroom Teaching: The Cognitive Gap and the Constitutive Role of Social Interaction

Enactive cognition proposed that social interaction play a constitutive role in social cognitive development [7]. The rationality of classroom teaching is not the efficiency of knowledge transmission or the accuracy of information processing, but is its capacity to effectively bridge the "cognitive gap" [5]. Cognitive gap refers to the huge span between the adaptive activities of simple life forms and the higher cognitive capacities of humans. Because it adhering to methodological individualism, traditional cognitive science can't explain the cognitive gap. Enactive cognition offers a new theoretical path to bridge the cognitive gap by emphasizing the constitutive role of social interaction.

Enactive cognition posits that cognition is not a computational process of an isolated individual but a process of meaning generated among individuals, "The Other", and the environment through sensorimotor coupling [7]. In classroom teaching, this coupling manifests as continuous interaction between teacher and students, and among students themselves. The teacher does not stand outside the students transmitting knowledge but co-constitutes an extended cognitive system with them. Within the system, the bodies, language, emotions, and actions of teachers and students mutually regulate, forming shared "sensorimotor loops", then generating shared classroom teaching meaning.

Heidegger's ontological analysis of "Being-with" provides philosophical support for the constitutive role of social interaction. Heidegger emphasizes that "Dasein" is essentially "Being-with" "The Other" in the world; the world is never "my" private sphere but a whole meaningful that "we" shared [6]. In the classroom teaching situation, the "Being-with" is embodied in the shared involvement and concern of teachers and students regarding the classroom teaching contents. The meaning of classroom teaching is not unilaterally bestowed by the teacher but emerges in the process of teachers and students jointly operating in a "ready-to-hand" manner, questioning, responding, and correcting. That is the rationality of classroom teaching lies in its provision of a field for "we" to co-generate meaning, rather than a channel for "me" to transmit information to "him".

When teachers and students engage in the dialogue, collaboration, and feedback in the classroom, they mutually regulate each other's sensations and actions, thus forming a larger "autonomous cycle". In the cycle, an individual's cognitive activity is not an isolated internal event but is embedded in a dynamic socio-cognitive network. This network not only supports the generation of immediate meaning but also provides the soil for the development of higher-order cognitive abilities. Thus, classroom teaching is not just a simple "teaching" and "learning" but a key link for individuals to achieve cognitive leaps through social interaction.

5. The Possibility of Classroom Teaching: The Conditions for Meaning Generation

The possibility of classroom teaching manifests itself in the generation of meaning, it is a meaningful practice that teachers with students explore and create together. As autonomous living beings, teachers and students engage in second-person interactions and collaboration within shared situation, forming a cyclical structure that enables the continuous generation of meaning within the "we".

Creating an embodied and participatory teaching situation can fulfill the self-sustaining conditions for meaning generation. Enactive cognition emphasizes that an organism must possess self-sustaining metabolic cycles to provide the original motive power for cognition [5]. Correspondingly, for the classroom teaching, it means students need autonomous space to regulate their own learning pace and choose their own engagement modes: task sheets should have blank sections, discussions must allow for digressions, and home works should offer multiple forms for response. At the time students can decide their own learning steps, the classroom teaching acquires the self-sustaining manner at the

level of the “living body”, and meaning generation not relies on external commands.

Through participatory sense-making, the classroom teaching can meet the “Being-with” condition for the generation of meaning. Heidegger uses “Being-with” to reveal the world is always “our” world, and “our” world is always co-determined by others. Classroom teaching design needs to break the unidirectional line of “teacher presets - student executes”, and instead adopt a cycle of “open-ended problem - collaborative inquiry - dynamic adjustment”. Which is the teacher poses problems without standard solutions, and students continuously reshape the problem, through collisions with classmates, tools, and the situation. Teaching objectives drift flexibly with the generative trajectory, allowing the external situation and internal rhythm to mutually trigger and co-determine the next step. The existential essence of classroom teaching is “Being-with”, meaning generation is social and enact meaning through actions of “Being-with”.

The design of scaffolded interactions in classroom teaching and facilitates intersubjective collaboration, can fulfills the conditions for the emergence of meaning. The sensorimotor loops of different individuals can form a larger autonomous cycle through continuous interaction, then producing a shared field of meaning. Classroom teaching needs to design tasks for joint completion: for example, groups assembling experimental apparatus, collaboratively enacting textual roles, co-drawing concept maps. During finish these tasks, someone’s action immediately alters the perceptual conditions for others, the other’s feedback in turn regulates the next person’s action; concepts are not only mastered by an individual but are continuously generated, modified, and enriched within the cycle, eventually becoming a new reality owned collectively by “us”. Meaning emerges from the interaction and coordination among various activities in the classroom teaching.

6. Conclusion

The meaning generation of classroom teaching is not merely a special topic in pedagogy, but a universal philosophical issue concerning how human beings authentically dwell together. To resolve the widespread state of meaning alienation in the technological age, this pater study the essence, value, rationality and possibility of classroom teaching from the perspective of enactive cognition. Centering on the embodied practice of teacher-student “Being-with”, reveal the opening of situation, generation of meaning and the emergence of meaning. In response to the profound existential and developmental challenges posed by intelligent society, this study contributes to the exploration of new classroom teaching that nourish life and enlighten wisdom.

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