

Research on the Innovation of Law Case Teaching Mode Assisted by Artificial Intelligence-Paradigm Reconstruction Based on Embodied Cognition Theory

Xing Liu¹, XiaoYan Yang²

¹*School of Law, Hunan University of Technology and Business, and Hunan Research Base for the Construction of Clean Governance, Xinhua, Hunan, China*

²*School of Law, Hunan University of Technology and Business, Linxiang, Hunan, China*

Abstract: This study constructs an intelligent case teaching paradigm based on embodied cognition theory from the perspective of the deep integration of cognitive science and legal education. By deconstructing the embodied characteristics of legal fact cognition, the study proposes a three-in-one teaching theory model of "multimodal interaction-semantic embodiment-contextual reconstruction", which breaks through the cognitive dilemma of subject-object dichotomy in traditional case teaching. The research results reveal the theoretical value of artificial intelligence technology in promoting the transformation of legal cognition from "conceptual representation" to "contextual embodiment", and provide a new epistemological framework for the cultivation of rule of law talents in the digital era.

Keywords: Embodied Cognition; Legal Education; Artificial Intelligence; Contextual Learning; Cognitive Paradigms

1. Introduction

Traditional law case teaching has long been trapped in the cognitive paradigm of "concept-centrism", which reduces legal facts to the linear transmission of textual symbols (Langdell, 1871), ignoring the essential characteristics of legal cognition of embodiment and context. Under the background of the construction of new liberal arts, artificial intelligence technology should not remain at the level of improving teaching tools, but should promote the fundamental transformation of the cognitive paradigm of legal education.

This study introduces Merleau-Ponty's phenomenology of the body

(Merleau-Ponty, 1945) and Varela's theory of embodied cognition, revealing the "embodiment" nature of the cognition of legal facts: legal understanding arises from the multimodal interactions between the subject and the environment, and judicial judgments are formed by the embodied practices in specific situations. Based on this, the theoretical framework of intelligent case teaching system is constructed, and its innovative value lies in: 1) realizing the paradigm shift of legal cognition from "disembodied abstraction" to "embodied experience"; 2) creating a new type of pedagogical relationship of "technologically mediated embodiment"; and 3) developing an ecological cognitive path for the cultivation of legal ability.

2. Cognitive Paradigm Dilemmas in Teaching Legal Cases

2.1 Cognitive Limitations of Conceptual Centrism

In the traditional teaching model, legal facts are often reduced to symbolic operations of propositional logic, a practice that has led to the emergence of the phenomenon of triple alienation:

1. Disembodiment of the cognitive subject: This pedagogical model creates a cognitive bias towards the "legal person in the head" by stripping away bodily perception and relying on the interpretation of cases to impart knowledge. It ignores the in-person experience and intuitive judgment in legal practice, and hinders a comprehensive understanding of the complexity and practicality of law (Dreyfus, 2002).

2. Abstraction of legal contexts: Traditional teaching often removes cases from the context of real situations, weakening the connection

between legal judgments and specific contexts. This de-contextualization dissolves the spatial and temporal dependence of judicial decisions, making it difficult for students to grasp the flexibility of the application of legal rules (Suchman, 1987).

3. Unidirectionalization of teaching interaction: The stereotypical "teacher teaches-student receives" model inhibits the cognitive subjectivity. The lack of opportunities for passive knowledge absorption and critical engagement limits the in-depth analysis and innovative application of legal knowledge. (ii) Methodological limitations of technological instrumentalism

2.2 Methodological Limitations of Technological Instrumentalism

Many of the current ITSs still follow the so-called "knowledge container" design concept (Papert, 1980). The dilemmas faced by this design philosophy are mainly manifested in the following aspects:

1. Unidimensionalization of the cognitive interface: the system compresses multimodal legal facts into a single text vector space, dissolving the diversity and richness of information.
2. the problem of discrete interaction process: the fragmentation of cognitive continuity leads to the inability to connect knowledge and skills organically, forming a "digital cognitive enclave" and hindering the effective connection with the real world.
3. The objectification of the teaching subject: the technological intermediary is alienated into a cognitive barrier, weakening the inter-subjectivity between teachers and students and leading to a double decline in the quality and depth of teaching interaction.

3. Theoretical Reconstruction from the Perspective of Embodied Cognition

3.1 The Nature of Embodied Cognition in Law

Based on the phenomenological concept of being-in-the-world, legal substance can be understood as the multidimensional existence of the body subject in the judicial context, reflecting the interaction between the body and the environment.

1. Embodied cognition: legal facts are not abstract, but are perceived in an embodied way

through visual, auditory, kinesthetic, and other sensory channels, revealing the role of the body as the foundation for the cognition of legal facts.

2. Contextual cognition: judicial judgment arises from the bodily practice in a specific context, and is formed through the embodied interaction of the judge and other subjects in the specific context, highlighting the constructive value of the context to the judicial decision.

3. Generative cognition: legal knowledge emerges and develops in the dynamic interaction between the subject and the environment, and its generativity is embodied in the continuous creation and updating process of legal practice and application.

3.2 Theoretical Model of Intelligent Case Teaching System

The construction of a "technology-mediated embodiment" (TME) pedagogical framework, which aims to enhance the learning experience through technological means so that learners can have a deeper understanding and mastery of knowledge.

1. Multimodal Interaction Layer: Building an audio-visual and tactile fusion space to promote multi-sensory legal fact cognition. The immersive learning environment is constructed through the simulation of real-life scenarios, which strengthens the embodied experience of legal knowledge.

2. Semantic Embodiment Layer: Using technical embodiment to realize the contextual anchoring of abstract concepts, transforming legal principles into perceptible practical scenarios, and enhancing the effectiveness of conceptual understanding.

3. Contextual Reconstruction Layer: Create a dynamic judicial ecological field, promote the internalization of knowledge through simulated practice, and realize the practical generation of legal knowledge.

The model breaks through the traditional "human-machine" binary framework and builds a subject-technology-environment ternary cognitive ecosystem. Artificial intelligence acts as a cognitive prosthesis in this system to realize the extension of legal cognitive ability rather than a simple replacement. This human-machine complementary relationship promotes the synergistic evolution of cognitive capabilities.

4. Innovative Paths of Teaching Paradigms

4.1 Multimodal Embodiment of Legal Facts

1. Perceptual Dimension Expansion: Integrating micro-expressions, voice intonation and other paralinguistic symbols in courtroom videos to build a multimodal cognitive material library. The program strengthens the judicial subject's three-dimensional perception of case details and psychological state through non-verbal information decoding.

2. Spatial dimension reconstruction: VR technology is used to construct a three-dimensional courtroom space, realizing the embodied experience of the judicial scene. Participants can realize the spatial sense and enhance the effectiveness of understanding the spatial relevance of the evidence chain and the contextual nature of the testimony through the spatial presence.

3. Time Dimension Extension: Timeline visualization technology is used to present the dynamic evolution of legal facts. The explicit expression of the chronology of events and causality provides a traceable time line support for judicial decision-making.

4.2 Ecological Construction of Situational Cognition

1. Cognitive scaffolding: Intelligent systems provide gradual and implicit cognitive support, adapted to the subject's ability development. The dynamic support framework guides learners to construct cognitive structures so that they can realize independent migration after mastering key competencies.

2. Cognitive Disturbance Creation: The design of antagonistic cognitive conflicts breaks cognitive homeostasis and triggers the schema reconstruction mechanism. Learners complete the systematic reorganization and upgrading of knowledge and experience through the elimination of cognitive conflicts.

3. Cognitive Trace Retention: Record the subject's cognitive trajectory throughout the whole process and construct individual cognitive maps. Through tracing the cognitive development pattern and evolution law, the design of personalized learning path can be optimized.

4.3 Paradigm Shift in Teaching-Learning Relationships

1. Transformation of teachers' roles: The transformation of the educational paradigm has pushed teachers from knowledge authorities to cognitive ecological gardeners. Their core function has shifted from instilling knowledge to cultivating an autonomous learning ecology, which catalyzes the sprouting of critical thinking and innovation by providing cognitive nutrients and growth scaffolds.

2. Reconstruction of student identity: learners are transformed from passive receivers to cognitive ecological co-constructors. Identity reconstruction emphasizes the autonomous construction and iterative upgrading of cognitive schema through knowledge negotiation and collaborative production, and problem solving practice.

3. Technology positioning innovation: technology is upgraded from an auxiliary tool to a structural element of cognitive ecology. Intelligent technology empowers the educational field, reshaping the underlying logic of knowledge production and dissemination through personalized learning path design and immersive interactive experience.

5. Theoretical Contributions and Academic Value

1. Epistemological breakthrough: The concept of "technologically mediated embodiment" is proposed to expand the boundaries of post-humanist legal education theory. By analyzing the intermediary existence of technology in legal education and revealing its symbiotic evolution mechanism with legal subjectivity, the cognitive paradigm of technology-subject relationship is reshaped.

2. Methodological innovation: constructing an ecological paradigm for legal cognition research, breaking through the individualistic cognitive paradigm. Legal cognition is placed in the social ecological network for systematic investigation, and a panoramic legal phenomenon analysis framework is constructed by analyzing the interconstruction of environmental elements and cognitive process.

3. Practical revelations: providing a dual approach to the construction of legal subjectivity in the age of intelligence: establishing the value of embodiment of technological mediation at the theoretical level, and proposing a strategy for the survival of subjectivity at the practical level. These

results provide a cognitive navigation and practical toolbox for lawyers to deal with the risks of technological colonization.

6. Conclusion

Integrating phenomenological and cognitive science theories to reveal the potential of AI to reconfigure the cognitive paradigm of legal education. Breaking through the limitations of technological efficiency enhancement and establishing the intelligent case teaching system as a catalytic medium for the transformation of the legal cognitive paradigm. Future research needs to focus on: the mechanism of technological embodiment's reconfiguration of legal subjectivity; and the ethical threshold of technological application in cognitive ecosystems. The breakthrough of these key issues will promote the paradigm leap of digital legal education theory.

References

- [1] Romdenh-Romluc, Komarine. Routledge philosophy guidebook to Merleau-Ponty and phenomenology of perception. Routledge, 2010.
- [2] Dreyfus, Hubert L. "Intelligence without representation—Merleau-Ponty's critique of mental representation The relevance of phenomenology to scientific explanation." *Phenomenology and the cognitive sciences* 1.4 (2002): 367-383..
- [3] Suchman, Lucille Alice. *Plans and situated actions: The problem of human-machine communication*. Cambridge university press, 1987..
- [4] Varela, Francisco J., Evan Thompson, and Eleanor Rosch. *The embodied mind*, revised edition: Cognitive science and human experience. MIT press, 2017.
- [5] Ihde, Don. *Technology and the lifeworld: From garden to earth*. Vol. 560. Indiana University Press, 1990.