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Issue Overview

This issue of *Journal of Psychology & Education* brings together five articles that examine education, ethics, philosophy, digital governance, and human development in a changing technological and cultural environment. The issue opens with a critical examination of algorithmic governance under digital capitalism, analyzing how data extraction, individual profiling, and behavioral prediction reshape power relations, social control, privacy, and human autonomy.

The issue then turns to comparative education from a historical and cultural perspective. By analyzing the differences, similarities, and possible integration paths of Chinese and Western education, the article reflects on how different civilizational traditions have shaped educational goals, teaching models, evaluation mechanisms, and contemporary possibilities for mutual learning.

A third contribution addresses the ethical challenges of AI emotional interaction. It focuses on the mechanisms through which emotional dependence may be formed in human-AI relationships and proposes governance pathways related to transparency, explainability, user autonomy, age-sensitive protection, ethics review, and addiction-mitigation design.

In the field of medical education, the issue includes a study of contextualized teaching in Medical Ethics. The article argues that medical ethics education should move beyond knowledge transmission toward value formation by using clinical scenarios, role experience, structured discussion, reflective writing, and multidimensional assessment to cultivate ethical sensitivity and humanistic judgment.

The issue concludes with a philosophical study of Zhuangzi's Daoism and the ecological implications of the concept of 'the usefulness of uselessness.' By connecting classical Daoist thought with contemporary concerns about ecological balance, sustainability, and natural coexistence, the article highlights the continuing relevance of Chinese philosophy for environmental ethics. Together, these contributions demonstrate the journal's interdisciplinary orientation and its concern with education, technology, culture, ethical responsibility, and the formation of humane social futures.

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**Algorithmic Governance under Digital Capitalism: A Critical
Examination of a New Mode of Power Operation**

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Abstract

Algorithmic governance has emerged as a novel mode of power operation in the era of digital capitalism. Grounded in advanced technologies such as big data, cloud computing, and artificial intelligence, it exercises comprehensive governance over individuals and society through mechanisms including data extraction, personalized profiling, and behavioral prediction. From a Marxist philosophical perspective, this paper offers a systematic and critical analysis of the technological foundations, operational mechanisms, and power logic of algorithmic governance. As a key instrument of digital capitalism, algorithmic governance enhances the precision and efficiency of social governance on the one hand, while generating a range of structural problems, including algorithmic bias and discrimination on the other hand, privacy infringement and pervasive surveillance, as well as new forms of human alienation. These problems reveal the inherent contradictions of digital capitalism and demonstrate the deep penetration of capital logic into social life through algorithmic governance, thereby highlighting the existential predicaments faced by individuals in the digital age. To overcome the dilemmas posed by algorithmic governance, it is imperative to uphold a people-centered approach, accelerate the development of legal and regulatory frameworks, enhance individuals' digital literacy, and construct a pluralistic model of collaborative governance. Only through such efforts can algorithmic governance be guided toward ethical ends and facilitate the harmonious advancement of both digital and social civilization.

Keywords: algorithmic governance; digital capitalism; digitalization; critique

Since the early twenty-first century, alongside the rapid development of the information technology revolution, capitalism has entered a new historical phase. The widespread application of intelligent digital technologies across various domains of social production and everyday life has profoundly transformed capitalist modes of production and social formations, giving rise to a new contemporary form of capitalism—*digital capitalism*. By reorganizing capital accumulation through digital logics, digital capitalism enables novel modes of surplus value appropriation and extends its reach into ideology and social life through mechanisms such as algorithmic governance. As a result, the digitalized social order has increasingly come to function as a form of “second nature”(Lin Q., 2024).

Algorithmic governance has emerged as a novel mode of governance under the conditions of digital capitalism. By relying on the computational and predictive capacities of algorithmic models, it exercises subtle and often imperceptible forms of control over living subjects, enabling the precise regulation and guidance of individual behavior in order to achieve governance objectives. Algorithmic governance not only embodies the developmental achievements of digital technologies but also reflects the deep penetration of capitalist logic into social life—what Jürgen Habermas famously conceptualized as the “colonization” of the lifeworld by instrumental rationality. Within the logic of algorithmic governance, autonomous and free subjects are increasingly reduced to datafied and homogenized symbolic objects, while concrete and substantive human needs are supplanted by virtual needs manipulated by digital capital. Algorithmic rationality thus obscures the

exploitative essence of capital, making processes of human alienation more concealed and less readily perceptible.

The rise of algorithmic governance within the context of digital capitalism not only manifests the comprehensive penetration of capitalist logic into society through digital technologies but also highlights the concrete predicaments confronting individual life in the age of intelligence. Guided by Marxism, a critical examination of the forms of digital existence shaped by algorithmic governance—together with an elucidation of the underlying logics of capital and power—holds significant theoretical value and practical relevance for grasping the essence of digital capitalism and, further, for exploring pathways toward the construction of a progressive and life-affirming form of digital civilization.

1. The power-operational model of algorithmic governance in digital capitalism

In the era of digital capitalism, algorithmic governance is emerging as a novel mode of power operation. Grounded in advanced technologies such as big data, cloud computing, and artificial intelligence, it exercises comprehensive forms of control and regulation over individuals and society through practices including data extraction, profiling, and behavioral prediction. In doing so, algorithmic governance profoundly influences and reshapes individuals' ways of life, modes of thinking, and value orientations.

1.1 The technological foundations of algorithmic governance: big data, cloud computing, and artificial intelligence

In the era of digital capitalism, the widespread application of big data

technologies provides a solid technical foundation for algorithmic governance. Characterized by massive volume, high velocity, and great variety, big data aggregates information from multiple dimensions, including social media activities, consumption records, and geolocation data, thereby rendering human beings themselves “a kind of resource”(Ignas Kalpokas, 2022). Through the collection, storage, cleaning, analysis, and mining of seemingly fragmented and heterogeneous data, big data technologies make it possible to uncover latent patterns, trends, and correlations. Relying on their powerful data-processing capacities, digital capitalist systems achieve panoramic sensing and highly precise prediction of individual behavior and social operations. In this sense, big data supplies algorithmic governance with abundant “digital raw materials,” enabling algorithms to continuously learn, optimize, and evolve from vast datasets, and thus to steadily enhance their capacities for analyzing, predicting, and guiding both individuals and society. Undoubtedly, the realization of algorithmic governance is inseparable from the robust support of big data technologies.

Cloud computing constitutes another crucial technological foundation for the implementation of algorithmic governance. By integrating vast computational resources over the Internet and delivering them in a service-oriented and flexible manner, cloud computing can meet diverse individual demands. On one hand, it enables the collection and aggregation of massive personal data dispersed across various devices and platforms, forming large-scale and multidimensional datasets that provide robust support for algorithmic profiling and behavioral prediction. On the other hand, the formidable computational power of cloud computing supplies the

necessary resources for the training and iterative refinement of complex machine learning algorithms, thereby allowing algorithms to efficiently underpin automated governance across society. The integration of cloud computing with algorithmic systems enables digital capitalism to leverage both data and computational power to permeate and govern multiple layers of social life.

The rapid advancement of artificial intelligence (AI) has provided algorithmic governance with powerful momentum. As a crucial branch of science and technology, AI aims to simulate, extend, and even surpass the boundaries of human intelligence—as exemplified by recent achievements such as ChatGPT. Significant progress has been made across theoretical exploration, methodological development, technological innovation, and practical applications. Currently, AI technologies represented by machine learning and deep learning have achieved revolutionary breakthroughs, enabling algorithms to autonomously learn from massive datasets, extract features, optimize models, and develop preliminary capacities for perception, cognition, decision-making, and execution. Digital capitalism skillfully leverages AI technologies to train a series of sophisticated intelligent algorithms capable of replacing human labor in various domains of social life and performing specific tasks. Empowered by AI, algorithms become increasingly intelligent, personalized, and autonomous, thereby rendering algorithmic governance more effective and dexterous.

1.2 The operational mechanisms of algorithmic governance: data collection, individual profiling, and behavioral prediction

As the primary stage of algorithmic governance, the collection of massive data

serves as both its foundation and prerequisite. In this process, digital platforms play a crucial role. Acting as a bridge between individuals and capital, these platforms provide diverse services to users while capturing the vast digital traces they leave in cyberspace, transforming them into valuable data resources. Data collection is often covert, continuous, and comprehensive; every action of individuals on digital platforms—whether actively shared or passively generated—is susceptible to algorithmic capture. As Nick Srnicek observes, the business model of platform capitalism extracts data from individuals, monetizes it, and then leverages this data to attract more users, thereby generating yet more data. It is precisely through the continuous accumulation of massive personal datasets that algorithms can exercise their powerful computational, analytical, and predictive capacities, driving transformations in social governance models.

Digital platforms leverage advanced artificial intelligence technologies to perform deep mining and intelligent analysis of massive datasets, thereby generating highly personalized individual profiles—an essential step in unlocking the value of data resources. Within the process of algorithmic governance, AI algorithms conduct comprehensive analyses of multidimensional personal data, precisely mapping individual characteristics and gaining deep insights into personal needs, transforming individuals from abstract symbols into “real, living persons.” The creation of personalized profiles provides a solid foundation for digital platforms to deliver targeted services. As scholars have noted, algorithms extract meaning from our digital traces, converting our traits, behaviors, and relationships into data points, which are

then assembled into targeted personal dossiers(Li Y. Q., 2022). The widespread application of personalized profiling technology furnishes critical support for digital capital to deeply understand individual needs and optimize resource allocation, establishing itself as a central fulcrum of algorithmic governance under conditions of digital capitalism.

While individual profiling delineates the contours of the self in virtual space, algorithmic governance is ultimately oriented toward the precise prediction of individual behavior, which constitutes its core operational mechanism. By further mining personalized profiles and employing deep learning algorithms trained on massive volumes of historical data, digital capital has become capable of making relatively accurate forecasts of individuals' future actions. On this basis, capital actors strategically deploy targeted advertising and personalized recommendations to subtly steer individuals toward choices and consumption practices that appear to align with their personalized preferences while simultaneously serving the imperatives of capital accumulation. Algorithmic technologies thus profoundly transform data resources into instruments of intensive surveillance and behavioral guidance. As a consequence, individual subjectivity is weakened, and individuals may unwittingly become executors of algorithmic strategies rather than autonomous agents.

1.3 The power logic of algorithmic governance: manipulation, discipline, and the shaping of the individual

Algorithmic governance, through the deep mining and analysis of vast data, precisely captures and predicts individuals' information and behavioral trajectories,

creating “digital portraits” of individuals and thereby manipulating their consciousness and actions. Digital capital, utilizing technologies such as algorithmic recommendations and personalized services, guides and shapes individuals’ thought patterns and decision-making behaviors, trapping them within the virtual environments constructed by algorithms. By reducing individuals to standardized data symbols, algorithms enable the comprehensive and meticulous classification and management of real persons, directing their behaviors. As one scholar points out, “Invisible ideological control and the manipulated collective unconscious have become the greatest concerns of the digital capitalist era”(Jiang Y. H., 2024). Driven by both digital technologies and capitalist logic, algorithmic governance covertly exercises precise control over individuals, thereby establishing a form of digital hegemony.

Algorithmic governance, as an intelligent governance tool, constructs a comprehensive digital disciplinary system by extensively collecting, deeply analyzing, and accurately predicting individual behavioral data. Compared to the “bodily discipline” traditionally imposed on workers in capitalist societies, this system introduces an additional dimension of “spiritual discipline.” Algorithmic analysis, as a novel source of cognition, challenges and reshapes traditional human modes of thinking. Under the influence of personalized algorithmic recommendations, digital laborers increasingly lose the freedom to choose their labor; their social attributes and individual characteristics are abstracted into a series of data labels, while different social statuses are obscured in digital space, giving rise to an algorithm-driven

disciplinary mechanism of “equality and freedom”. Beneath this seemingly neutral algorithm lies the operational logic of capital power, with digital discipline serving as a critical tool in shaping “docile individuals”.

As a covert and flexible governance strategy, algorithmic governance profoundly influences the form and cognition of individuals, shaping their perceptions and values. By transforming multidimensional information from real life into data symbols, algorithmic governance causes individuals to gradually lose themselves and their authenticity within the virtual experiences of the digital world. Capital, through algorithmic governance, deeply mines and analyzes vast amounts of data, gaining precise insights into individuals’ latent needs, and then subtly guides and shapes personal behaviors and thoughts through means such as personalized recommendations. Algorithms also capture and analyze individuals’ emotional data, thereby capitalizing on emotions(Zuo L. P., 2023). Capital deeply hijacks human emotions, reducing individuals to “emotional slaves” in the digital realm. The capitalization of emotions not only intensifies the alienation of individuals under capitalism but also erodes the genuine emotional bonds between people. Thus, emotional capitalism emerges as a new pathway for “shaping” individuals in the digital age. In short, individuals’ thought habits and value systems are imperceptibly reshaped by algorithmic governance, gradually transforming them into a form of digital existence that aligns with algorithmic logic.

2. The potential risks of algorithmic governance under digital capitalism

As a key tool of digital capitalism, algorithmic governance enhances the

effectiveness of social governance; however, it also harbors numerous risks and challenges, including algorithmic bias and discrimination, privacy violations and surveillance, as well as algorithmic manipulation and human alienation. These issues pose significant ethical, social, and political concerns, requiring careful consideration and regulation.

2.1 Algorithmic bias and discrimination: the illusion of technological neutrality

One of the major problems generated by algorithmic governance under digital capitalism is algorithmic bias and discrimination. Algorithms are by no means purely “neutral” technical entities that exist outside social structures and power relations. Technology is never neutral; rather, it constitutes a concrete manifestation and objectification of specific social relations and is ““highly dependent on the wider power relations, values and ideologies in society”(Jernej A. Prodnik, 2021). Algorithmic systems are inevitably embedded with the values and ideological orientations of their designers and users. Under digital capitalism, the capital logic of profit maximization profoundly shapes the design and implementation of algorithms, making it highly likely that existing social biases and forms of discrimination—such as those based on class, race, or ethnicity—are further entrenched and amplified through algorithmic modeling and application. It must also be emphasized that the data on which algorithms are trained are not inherently neutral or objective. Rather, they reflect human social activities, and their collection and processing are unavoidably influenced by prevailing power structures in society. The values and preferences of dominant social classes and groups are often directly inscribed in data

and subsequently learned and reinforced by algorithms. By contrast, the voices and needs of marginalized groups are more likely to be ignored or distorted in data representations, resulting in algorithmic governance that is structurally biased from the outset. Of particular concern is the way digital capitalism cloaks such biases and discrimination under the guise of technological neutrality, deploying algorithms as instruments of ideological legitimation. Algorithms are frequently portrayed as purely rational and objective mathematical models, a strategy through which capitalism obscures its power interests and misleads the public.

2.2 Privacy violations and surveillance: the inescapable digital panopticon

Algorithmic governance under digital capitalism harbors a novel mode of domination characterized by digitalized panoptic surveillance—what may be described, borrowing from Michel Foucault, as a form of “panoptic transparency.” Humanity has thus entered what Shoshana Zuboff terms “the age of surveillance capitalism”(Shoshana Zuboff, 2019). Within this regime, capital relies on big data analytics and algorithmic technologies to comprehensively collect, store, and utilize personal information, constructing an all-encompassing digital surveillance network. This network not only captures behavioral traces in cyberspace but also extends into multiple dimensions of individuals’ offline lives. With the widespread adoption of digital devices, such as smartphones and wearable technologies, capital can monitor individuals’ locations, behavioral patterns, and even physiological data in real-time, subjecting personal privacy to unprecedented challenges. Sensitive information—including daily habits, social networks, and consumption choices—is

capitalized as a tool for profit extraction, often without individuals' awareness and with little possibility for effective resistance, thereby posing a serious threat to personal autonomy and freedom. Under conditions of digital panoptic transparency, individuals' words and actions, emotional expressions, and even ideological inclinations are rendered susceptible to precise algorithmic analysis and prediction. As individual profiling becomes increasingly refined, personalized information filtering and behavioral guidance grow more pervasive, gradually eroding individuals' freedom of choice. The algorithmically constructed "filter bubbles" impede the circulation of diverse viewpoints, leading to the contraction of public space, while individuals are increasingly reduced to passive objects exposed to the inescapable glare of "digital sunlight".

2.3 Algorithmic manipulation and human alienation: individuals tamed by algorithms

Through the collection, analysis, and application of big data, algorithms provide individuals with personalized services while simultaneously exerting subtle yet pervasive influence and control. In this process, individuals are imperceptibly "tamed", becoming "alienated subjects" shaped by algorithmic systems. Personalized recommendations and precision marketing selectively deliver information and advertisements by analyzing individuals' digital characteristics, thereby steering and reshaping their behavioral decisions. Beneath the surface of convenience, such services entail an erosion of individual autonomy, a tendency further intensified by the algorithm-driven logic of social media platforms. Under the dynamics of the

“attention economy”, the seemingly diverse and vibrant content of social media is in fact the product of algorithmic optimization. This not only marginalizes rational and in-depth discourse but also compels individuals to continuously adapt themselves to algorithmic preferences in order to gain visibility, attention, and recognition. More seriously, the manipulative and alienating effects of algorithms exacerbate the digital divide and deepen social inequalities. Vulnerable groups located on the disadvantaged side of this divide are further deprived of voice and agency, increasingly relegated to the margins of digital society.

3. A critique of algorithmic governance under digital capitalism

Algorithmic governance constitutes a key governance strategy of digital capitalism. In essence, it represents the penetration and encroachment of capitalist logic into the domain of biopolitics. To critique algorithmic governance is therefore to expose the alienating logic of digital capitalism, to awaken individual subjectivity, and to resist the invisible forms of control exercised by digital capital.

3.1 An ideological critique of algorithmic governance: the false promises of digital capitalism

Algorithmic governance, centered on intelligent algorithms and enabled by technologies such as digital platforms and big data, allows the exploitative logic of capitalism to permeate every corner of social life. At first glance, algorithmic governance appears to offer new momentum for social progress and development through its efficiency, precision, and personalization. Yet these seemingly attractive promises in fact constitute a form of false ideology that conceals the exploitative

essence of digital capitalism.

First, algorithmic governance intensifies capital's exploitation and control of labor. In the sphere of digital labor, workers are rendered objects of data analysis and prediction and are disciplined by intelligent algorithms; even their everyday lives are subjected to comprehensive surveillance. As a result, individuals lose autonomy and creativity, becoming mere appendages of algorithms and instruments of capital accumulation. At the same time, algorithmic recommendation systems and personalized services further exacerbate consumer alienation by manipulating desires and behaviors and disseminating a consumerist culture.

Second, algorithmic governance deepens the digital divide and exacerbates social inequality(Yan K. R. & Li Y., 2023). By “profiling” and categorizing individual characteristics, intelligent algorithms construct digital hierarchies and forms of identity stratification. Digital capitalists who control data and algorithms dominate the allocation of market resources, while the vast majority of individuals are reduced to “captives” of algorithms and “slaves” to data.

Finally, algorithmic governance intrudes upon personal data privacy. Many digital platform corporations engage in large-scale collection, analysis, and utilization of personal data through algorithmic systems, seriously infringing upon individuals' privacy rights. Moreover, the opacity and autonomy of platform algorithms give rise to risks of data abuse and security vulnerabilities; once data breaches occur, personal privacy is transformed into openly exposed “public secrecy,” posing threats to social stability and security.

In sum, through algorithmic governance, digital capitalism accomplishes a digital transformation of capitalist logic, extending exploitation and control into all domains of social life and turning algorithms into ideological instruments that sustain capitalist domination. Its purported promise of progress and development is, in reality, a concrete manifestation of exploitation and alienation.

3.2 A critique of the technological alienation of algorithmic governance: the extreme manifestation of instrumental rationality

Instrumental rationality is essentially oriented toward the maximization of utility, treating all objects as calculable and manipulable means while disregarding human subjectivity and intrinsic value. In the era of digital capitalism, instrumental rationality has been intensified to an unprecedented degree, particularly through the pervasive application of algorithms, by which both individuals and society are comprehensively quantified and instrumentalized, leading to a severe erosion of personal subjectivity and autonomy. Algorithms, which as productive tools ought to serve human ends, are instead appropriated by digital capital as embodiments of instrumental rationality and become alienated into instruments for dominating human beings.

Algorithmic governance subjects both individuals and society to comprehensive quantification through data, digitizing and symbolizing every aspect of personal life while remaining blind to the richness and diversity of the lifeworld and the vitality of the human spirit. Through data analysis and computation, algorithms monitor, predict, and control individual behavior and social processes, alienating human beings into

mere data sources and objects of application—passive “puppets on strings.” This constitutes the first manifestation of instrumental rationality’s intrusion into the lifeworld.

While pursuing the goal of utility maximization, algorithmic governance reduces interpersonal relations to data connections, negating the dimension of intersubjectivity and disregarding the emotional and ethical foundations of human interaction. As a result, affective bonds between individuals grow increasingly attenuated, and humane forms of communication gradually recede. The virtual, algorithmically structured digital world immerses individuals in the illusory gratification of online interaction while weakening their ties to the real world, fostering attitudes marked by aggressiveness in online discourse and even encouraging avoidance of face-to-face communication, which may in turn contribute to what is commonly described as “social anxiety.” The algorithmic intrusion into interpersonal relations is quietly transforming the very nature of human interaction—this constitutes the second manifestation of instrumental rationality’s colonization of the lifeworld.

As an extreme expression of instrumental rationality, algorithmic governance also disregards normative values such as holistic human development, fairness, justice, and freedom. Under algorithmic imperatives, efficiency becomes the overriding priority, while the demands of value rationality are relegated to secondary status. The historical data on which algorithms are trained often embed deep-seated social biases, and by reducing individuals to data symbols, algorithms neglect the uniqueness and comprehensive developmental needs of persons. Ultimately, this leads individuals to

lose the courage for independent thought and the space for personalized and all-round development. Digital technologies, having become instruments of capital's pursuit of profit, thus deviate from their original promise of fostering free and comprehensive human development. This constitutes the third manifestation of instrumental rationality's invasion of the lifeworld.

Taken together, these three manifestations demonstrate that algorithmic governance represents an extreme form of instrumental rationality in the contemporary era of digital capitalism and reveals the latter's underlying logic.

3.3 A critique of human alienation under algorithmic governance: new forms of alienation

As a novel form of power in the digital age, algorithmic governance not only reshapes the relationship between human beings and the world but also gives rise to new forms of human alienation. Under digital capitalism, human essence and the meaning of existence are being reinterpreted and redefined, while individuals increasingly appear to be reduced to prisoners of the digital images they themselves have created. Only through critical resistance can one break free from this contemporary "allegory of the cave" and return to an authentic sense of self.

Algorithmic governance renders individuals standardized and homogenized. As Johann Gottfried Herder once observed, each person possesses his or her own measure. Yet algorithms not only predict individual behaviors and needs through precise data interpretation but also deliver standardized services and content, drastically reducing the diversity of available choices and pushing individual behavior

and thought toward homogeneity. Through personalized recommendation systems, algorithms steer individuals into tailor-made “filter bubbles,” in which the information to which they are exposed becomes increasingly uniform. This not only constrains individuals’ epistemic horizons but also imperceptibly reshapes their worldviews and value orientations. Behavioral choices likewise begin to converge toward goals preconfigured by algorithmic logic, leading to the gradual erosion of individual differences.

At the same time, behaviors that deviate from algorithmically predefined norms are often subject to various forms of “penalty,” further reinforcing behavioral conformity and homogenization. In sum, algorithmic governance precipitates the erosion of individuality and difference, transforming human beings into standardized and homogenized data points and, ultimately, standardizing and homogenizing the human subject itself.

Algorithmic governance renders individuals increasingly dependent and passive. From the perspective of subjectivity, algorithmic governance undermines human agency and autonomy. Relying on advanced algorithms, various digital platforms conduct deep mining and analysis of vast and complex datasets to provide individuals with customized information recommendations and decision-making support. As a result, individuals gradually develop a pattern of passive adaptation to algorithmic arrangements, accompanied by a decline in their capacities for independent thinking and autonomous choice.

While the intelligence and automation of algorithms do address certain practical

problems, they also cause individuals to progressively lose initiative in their interactions with algorithmic systems, slipping into a state of passivity. Under conditions of precise algorithmic recommendation and prediction, individuals often accept algorithmic selections uncritically, without reflecting on or questioning the underlying logic and value judgments embedded in algorithms. This weakens critical thinking abilities and, in turn, deepens individuals' dependence on algorithms, forming a self-reinforcing vicious cycle. In sum, as people become accustomed to relying on algorithmic recommendations and decisions, autonomy and independence gradually erode; individuals are shaped and manipulated by algorithms and ultimately reduced to appendages of digital power.

Algorithmic governance renders individuals partialized and fragmented. From a cognitive perspective, algorithmic governance intensifies the phenomenon of filter bubbles, leading to a progressive narrowing and distortion of individuals' cognitive horizons. By selectively pushing information based on personal preferences and historical behavioral data, algorithms construct a closed-loop information ecology that confines individuals' understanding of the objective world to increasingly limited frames.

From the perspective of temporal experience, algorithmic governance likewise generates problems of "fragmented attention," exacerbating the fragmentation of individuals' sense of time. In the era of digital capitalism, algorithm-driven information streams continuously stimulate human senses, making it difficult for individuals to sustain prolonged attention on a single object. As some scholars have

observed, the pace of information flows far exceeds the adaptive capacity of the human brain, resulting in a “poverty of experience”(Claudio Bueno, 2017). In this context, learning, work, and everyday life are broken down into fragmented temporal units, with individuals frequently switching between different applications and platforms, leaving little space for deep reflection or immersive engagement with life.

4. Coping strategies for algorithmic governance under digital capitalism

In the face of the various challenges and problems brought about by algorithmic governance under digital capitalism, it is imperative to actively explore effective responses. Marxism provides clear theoretical guidance in this regard: it is essential to uphold a people-centered orientation, focus on the all-round development of human beings, and promote the construction of a well-regulated, orderly, and pluralistic framework of algorithmic governance based on co-governance.

4.1 Establishing a human-centered approach to algorithmic governance: reshaping the relationship between humans and technology

A human-centered orientation constitutes the core of algorithmic governance. Establishing such an approach means fundamentally reshaping the relationship between human beings and technology, preventing algorithms from exerting oppressive or alienating effects on individuals, guiding digital technologies toward the common good, and fostering the free and comprehensive development of human beings.

Upholding a human-centered approach to algorithmic governance means taking the people’s aspiration for a better life as its primary principle and fundamental

objective. As General Secretary Xi Jinping has emphasized, “We must adhere to a people-centered development philosophy and implement the new development concept”(Xi J. P., 2022). This important statement provides clear normative guidance for algorithmic governance. Algorithmic governance is not an end in itself but a means; its ultimate purpose lies in enhancing people’s well-being. Accordingly, algorithms must be designed, deployed, and optimized on the basis of popular needs, so that the fruits of development are distributed more equitably and benefit the broadest segments of society. Particular vigilance is required to prevent algorithms from degenerating into instruments of capital accumulation and personal manipulation, ensuring that their operation aligns with the interests of the people and safeguards human subjectivity in the age of artificial intelligence.

Regardless of technological advancement, human beings remain primary, while technology is secondary. Adhering to the Marxist historical materialist perspective, algorithmic governance should take the free and comprehensive development of human beings as its fundamental standpoint, guaranteeing human primacy in technological relations and preventing technology from becoming an alienated force that dominates human life. At the same time, it is essential to promote a harmonious, symbiotic, and mutually beneficial relationship between humans and algorithms. While algorithmic governance has significantly enhanced social productive forces and injected new momentum into human development, its loss of control or misuse can also infringe upon individual rights and exacerbate the digital divide. A dialectical approach is therefore required: while fully harnessing the positive functions of

algorithmic governance, it is necessary to reaffirm a human-centered value orientation, strengthen interdisciplinary research, and promote collaborative innovation across fields such as artificial intelligence, neuroscience, and psychology. In this way, the humanization and personalization of algorithms can be continuously improved, ultimately realizing coordinated development and mutual benefit between human beings and algorithmic governance.

4.2 Improving the legal framework of algorithmic governance: strengthening accountability and regulation

To effectively address the various potential risks posed by algorithmic governance, it is essential to accelerate the improvement of the legal framework governing algorithms and to strengthen mechanisms of accountability and regulatory oversight.

Only by accelerating the improvement of the legal system for algorithmic governance, refining accountability mechanisms, innovating regulatory approaches, and strengthening international cooperation can algorithmic governance develop in an orderly and healthy manner. It is imperative to expedite the establishment of a dedicated legal and regulatory framework for algorithmic governance that clearly defines fundamental principles, normative boundaries, and legal responsibilities, thereby laying a solid legal foundation for the proper governance of algorithms.

Equally crucial is the improvement of accountability mechanisms in algorithmic governance. As a complex and systematic undertaking, algorithmic governance involves multiple actors, including algorithm developers, platform operators, and end

users. It is therefore necessary to clearly delineate the responsibilities and obligations of each party and to construct a collaborative governance framework characterized by shared responsibility and coordinated action.

In addition, innovation in regulatory approaches has become indispensable. As algorithms increasingly exhibit cross-jurisdictional, end-to-end, automated, and opaque characteristics, traditional regulatory models are no longer adequate for the demands of the intelligent age. Accordingly, regulatory concepts must be updated, regulatory instruments diversified, and the anticipatory, targeted, and effective capacities of oversight enhanced. Strengthening *ex ante* governance is particularly important, including the improvement of mechanisms such as algorithmic registration, review, and assessment, in order to prevent governance risks at their source.

Finally, reinforcing international cooperation in algorithmic governance is of vital importance. Algorithmic governance is inherently a global issue, and no single country can address all related challenges in isolation. It is therefore necessary to deepen dialogue and cooperation with other countries on the basis of mutual respect and win-win collaboration, jointly exploring international rules for algorithmic governance and collectively responding to shared challenges.

4.3 Cultivating individual digital literacy: enhancing autonomy and critical capacity

At the individual level, in the era of digital capitalism, it is essential to continuously enhance one's digital literacy and to strengthen autonomy and critical capacity, so as to discern directions within an increasingly complex digital

environment, make effective and reflective use of technology, and ultimately become an active participant in the construction of digital civilization.

Individuals must strengthen their understanding of and capacity to use digital technologies, cultivating autonomous consciousness grounded in independent thinking and rational judgment, while the state and society should create favorable conditions for the enhancement of individual digital literacy. Individuals should take the initiative to familiarize themselves with frontier technologies such as big data, artificial intelligence, and blockchain; master key skills including online information retrieval, information filtering, and data analysis; and enhance digital security awareness by learning how to protect personal privacy and data security and guard against cyber fraud and malware.

In a digital environment characterized by algorithmic recommendation and information overload, individuals are prone to losing their bearings and conforming unreflectively. It is therefore essential to uphold one's subject position and independent personality, adopt a cautious and critical attitude toward online information, and avoid blind following or credulity toward rumors. Individuals should learn to distinguish truth from falsehood, resist misinformation and "brainwashing-style" propaganda, and maintain clarity of judgment when confronted with algorithmically pushed content, adhering to sound values and ethical standards. Conscious opposition to cyberviolence and the maintenance of civility and friendliness in cyberspace are likewise crucial to ensuring that individuals do not lose themselves amid digital complexity. Moreover, individuals should penetrate the

capital logic underlying digital technologies and remain vigilant against their alienating effects on human subjectivity.

For governments and the state, it is necessary to strengthen top-level design and improve digital infrastructure so as to facilitate individuals' participation in digital life. At the same time, efforts to govern cyberspace should be intensified, including cracking down on illegal and criminal activities and fostering a clean and orderly online environment. Equally important is the reinforcement of digital education by incorporating digital literacy into the national education system and raising the overall level of digital skills across society. This can be achieved, for example, through the organization of diverse digital literacy training programs and practical activities aimed at enhancing individuals' digital competencies.

4.4 Building a collaborative governance mechanism with plural participation: leveraging the positive role of social forces

In the era of digital capitalism, traditional government-centered governance models are confronted with profound challenges. It is therefore imperative to fully mobilize the forces of society at large and to construct a new governance framework characterized by pluralistic participation and collaborative co-governance, in order to effectively address the complex challenges of social governance in the era of digital capitalism.

As a bridge between government and the market, social forces possess distinctive advantages in coordinating diverse interests and promoting social cohesion. Social organizations not only provide a voice for multiple interest groups and facilitate the

effective resolution of social conflicts, but also deliver diversified public services, thereby compensating for gaps left by government and market provision. In order to address the risks associated with algorithmic governance, it is necessary to construct a collaborative governance platform with pluralistic participation and to ensure smooth channels for social forces to engage in algorithmic governance.

Algorithmic governance is a systematic undertaking that requires the joint participation of multiple actors, including government, enterprises, social organizations, and the general public. By establishing mechanisms for dialogue and consultation, encouraging cross-sectoral cooperation, broadening participation channels, and strengthening capacity-building, it is possible to enhance societal awareness of and engagement in algorithmic governance and to foster a collective governance synergy. At the same time, it is essential to cultivate a positive and healthy public opinion environment in order to build broad social consensus.

Algorithmic governance not only bears on a country's long-term development but also directly affects the vital interests of every individual. Accordingly, strengthening public education, deepening media coverage, and making use of online platforms for interactive communication to raise algorithmic literacy and guide rational public participation are necessary conditions for constructing a collaborative governance mechanism with plural participation. In short, in the face of the challenges posed by algorithmic governance under digital capitalism, only by adhering to the principles of pluralistic participation and collaborative co-governance, actively leveraging the role of social forces, continuously improving legal institutions, and building open and

inclusive governance platforms can society effectively respond to algorithm-induced governance challenges, advance the modernization of algorithmic governance systems and capacities, and promote the harmonious development of digital civilization and social civilization.

5. Conclusion

In the era of digital capitalism, algorithmic governance has emerged as a novel mode of power operation. While it enhances the efficiency of social governance, it also gives rise to a range of pressing problems. Phenomena such as technological alienation, individual alienation, and the widening digital divide associated with algorithmic governance reflect the inherent contradictions of digital capitalism and underscore the deep penetration of capitalist logic into social life. Marxist philosophy offers a critical theoretical lens and a powerful intellectual tool for examining algorithmic governance and uncovering the underlying logics of capital and power that sustain it.

In confronting the challenges posed by algorithmic governance, it is imperative to adhere to a people-centered development philosophy, establish a human-centered approach to technological development, and reshape the relationship between human beings and technology so as to ensure human subjectivity in the age of artificial intelligence. At the same time, efforts should be accelerated to improve the legal framework of algorithmic governance, strengthen accountability and regulatory oversight, and provide solid institutional safeguards for its proper functioning.

At the individual level, continuous enhancement of digital literacy is essential in

order to strengthen autonomy and critical capacity, enabling individuals to become active participants in the construction of digital civilization. At the societal level, the positive role of social forces should be fully mobilized through the establishment of collaborative governance mechanisms with pluralistic participation, thereby forming a powerful collective force capable of addressing and ultimately mitigating the harms associated with algorithmic governance.

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**An Analysis of the Differences, Similarities and Integration Paths of
Chinese and Western Education from the Perspective of History and
Culture**

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Abstract

In today's era of accelerating globalization and deepening internationalization of education, the exchanges and collisions between Chinese and Western education are becoming increasingly frequent. Clarifying the similarities and differences between the two not only helps to deeply understand the essential laws of education under different cultural backgrounds but also provides references for China's educational reform. The different cultural origins of China and the West determine their distinct paths. As is well known, education, as the core carrier of civilization inheritance and talent cultivation, has formed distinctive educational systems in China and the West due to differences in historical accumulation, cultural genes, and social structures. While there are essential commonalities, significant differences exist in educational concepts, teaching models, evaluation mechanisms, and educational goals. However, we should rationally approach these differences and learn from each other. This article, based on the cultural roots and social historical development backgrounds of China and the West, systematically sorts out their similarities and differences, deeply analyzes the underlying reasons for the differences, objectively examines their respective strengths and weaknesses, and explores feasible paths for the integration and mutual learning of Chinese and Western education in the new era.

Key words: Education in China and the West; Historical and cultural background; Differences

Different historical cultures determine different educational characteristics and educational environments. There is no doubt that there are significant differences between Chinese and Western education. As a social practice activity unique to human society for inheriting culture, cultivating talents, and promoting progress, education is

deeply influenced by the historical accumulation of a specific region, the core nucleus of cultural genes, the social structure form, and the mainstream value concepts, presenting distinct regional and ethnic characteristics. Chinese education is rooted in the continuous Huaxia agricultural civilization of five thousand years, with Confucian ritual and music culture and the idea of moderation as its core spiritual foundation. It has undergone iterative development of ancient private school education, modern new-style education, and modern quality-oriented education, and has undergone thousands of years of inheritance and innovation, forming an educational characteristic that values the foundation, advocates diligence, and emphasizes collectivity. Western education originated from ancient Greek civilization and city-state culture. It has gone through religious education in the Middle Ages, the Renaissance movement, the Enlightenment, and the rise of practicalist education during the Industrial Revolution and the improvement of the modern education system, forming an educational paradigm that respects individual nature, encourages innovation and exploration, and values freedom and independence, which is adapted to the development of Western society. Although Chinese and Western education have formed distinctive educational systems due to differences in cultural roots, social structure, and development needs, they share a high degree of commonality in the essence of education, social mission, and educational laws. This article will take a holistic perspective to explore the commonalities and differences between Chinese and Western education, deeply explore the cultural logic and social causes behind them, and have both theoretical value and practical significance, so as to provide reference.

I. The Impact of History and Culture on Education in China and the West

In the context of globalization and educational modernization, clarifying the factors influencing education in China and the West can not only help better understand the essence of the educational differences between the two, but also promote mutual learning, compatibility, and mutual advancement between them. The agricultural civilization centered on Confucian ethics and the social structure of family and state integration in China, and the ocean civilization centered on

humanistic rationality and the individual-oriented value system in the West, respectively, have laid the foundation for the education of the East and the West. Chinese education is rooted in the 5,000-year-old agricultural civilization and the Confucian ethical system, emphasizing collective orientation, moral education, and knowledge transmission. The core cultural genes of traditional Chinese education are Confucianism, while absorbing the ideas of Daoism that adapts to nature and Legalism that combines rites and laws, and constructing an educational system with "rites" as the behavioral code and "virtue" as the value core, which has become the spiritual mainline throughout the history of ancient Chinese education. In the pre-Qin period, Confucius established private schools and proposed viewpoints such as "education for all" and "teaching according to individual aptitude", breaking the monopoly of education by the nobility and establishing the civilian-oriented attribute of education. During the reign of Emperor Wu of Han, adopting Dong Zhongshu's suggestion and implementing the cultural policy of "abolishing all schools of thought and upholding Confucianism alone", Confucianism became the orthodox ideology in the feudal society, and education has since been deeply integrated with state governance, social ethics, and talent selection. Successive dynasties' educational systems, teaching contents, and value orientations have continuously evolved based on this foundation. While Western education originated from the rational spirit of ancient Greece and has undergone the 洗礼 of the Renaissance and the Enlightenment, highlighting individual orientation, rational speculation, and innovative exploration. The "method of the midwife" proposed by Socrates , the education in Plato's Republic, and the disciplinary study advocated by Aristotle laid the foundation for Western education to value rational speculation, logical reasoning, and individual development. During the Middle Ages , the church monopolized education , although it was mainly focused on religious indoctrination , it retained the transmission lineage of classical academia. The Renaissance and the Enlightenment completely reshaped Western education. The Renaissance advocated humanism , breaking the constraints of religion on human nature, emphasizing human value and

dignity, and advocating that education should promote the harmonious development of individuals' physical and mental aspects. The Enlightenment promoted rationalism, advocated freedom, equality, and science, and promoted education towards citizen cultivation and scientific exploration. After the Industrial Revolution, Western education further integrated scientificism and pragmatism, forming an educational tradition that values individuality, innovation, and evidence-based thinking, and the realization of individual value has become one of the core goals of education. There is no absolute superiority or inferiority between Chinese and Western education; they are cultural products that adapt to their respective social needs.

2. The high degree of alignment in the essence of education is the inherent logic for the convergence of Chinese and Western education paths

Although there are significant differences in cultural inheritance, teaching content, teaching methods, and external manifestations between Chinese and Western education, they share a high degree of compatibility in core purposes, basic functions, and ultimate goals. Education is a common human practice that transcends regions, ethnicities, and cultures. Although Chinese and Western education differ due to historical contexts, cultural inheritance background, national conditions, and social conditions, they both belong to important branches of human educational civilization and always revolve around the core of education for nurturing individuals. Their fundamental purposes, social functions, and educational goals share a high degree of internal commonality.

Firstly, the core goal is to cultivate individuals. Whether it is the "cultivating virtue and fostering talents" advocated by Chinese education or the "all-round education" promoted by Western education, the ultimate goal is to cultivate individuals with comprehensive development in morality, intelligence, physical fitness, aesthetics, and labor, achieving physical and mental health and personality perfection. Although the expression methods and cultural contexts are different, the ultimate goals are highly compatible. Ancient Chinese education pursued "self-cultivation, family governance, state governance, and world peace", emphasizing the cultivation of virtues such as benevolence, righteousness, propriety,

wisdom, and trustworthiness, striving to cultivate individuals with both moral and intellectual qualities, integrating moral cultivation with academic improvement. Modern quality-oriented education even emphasizes people-oriented principles, not only focusing on students' academic performance and knowledge reserves, but also paying attention to the coordinated development of students' physical, psychological, intellectual, and moral aspects. Western education is also long-standing. From ancient Greece's "harmonious education", to modern Rousseau's naturalistic education, Dewey's pragmatism education, to modern general education, it all focuses on the development and improvement of individuals, aiming to make each individual an independent, complete, and valuable person. Looking at the educational practices of China and the West, both have abandoned simple knowledge indoctrination and mechanical skill training, taking "education for nurturing individuals" as the core of education, highlighting the human-centered nature of education, and reaching a consensus on this point.

Secondly, they undertake the mission of cultural inheritance and social development. Education is an important link in cultural inheritance and the core driving force for social progress. This function is the common responsibility of both Chinese and Western education. Chinese education has always been tasked with inheriting excellent traditional Chinese culture and promoting national spirit, passing on Chinese civilization from generation to generation. At the same time, education helps the country cultivate various talents, promoting social development, technological progress, and national prosperity. Education has become the core means of inheriting Chinese civilization and strengthening national cultural confidence, allowing the profound and extensive Chinese civilization to remain vibrant in intergenerational transmission. Western education also bears the dual mission of cultural inheritance and social development. On the one hand, it inherits the essence of ancient Greek and Roman cultures, Christian culture, Enlightenment thought, etc., safeguarding the roots of Western culture; on the other hand, through innovative education, civic literacy education, it cultivates citizens who are adapted to social development, promoting the process of social democratization and legalization. Both

have enabled individual growth and social development to be mutually empowering, demonstrating the social value of education.

Thirdly, they follow the basic laws of education. The educational practices of all times and places prove that following educational laws is the fundamental prerequisite for improving teaching quality and achieving educational goals. This principle runs through the entire process of the development of Chinese and Western education. Both Chinese and Western education have, through long-term practice, summarized teaching methods and educational principles that conform to human cognitive laws, forming a common educational logic. In the teaching process, both emphasize progressive learning and individualized teaching, focusing on stimulating students' interest in learning, guiding students from passive acceptance to active exploration. In the teacher-student relationship, both recognize the guiding role of teachers and the dominant position of students, pursuing interaction and cooperation between teachers and students. In educational content, both cover core modules such as basic knowledge, humanistic literacy, and practical ability, balancing fundamentality and practicality. Whether it is China's "reviewing past knowledge to gain new insights" or the "inquiry-based teaching" in the West, both are the scientific application of educational laws and reflect the commonality of educational practices.

3. Different historical and cultural backgrounds have shaped the diverse forms of education in China and the West

The differences in education between China and the West are the result of the combined influence of historical traditions, cultural values, political systems, etc, and are also the inevitable outcome of the long-term historical evolution. These differences are mainly manifested in aspects such as educational concepts, teaching models, curriculum design, evaluation systems, and teacher-student relationships. Such differences run through the entire process of education, from the top-level educational concepts to specific implementation paths, forming two completely different educational styles, each with its own advantages and disadvantages.

Firstly, there is a fundamental difference in educational concepts. Chinese education places more emphasis on the collective orientation, which is the concrete

manifestation of core cultural concepts such as Confucianism's "family and state are integrated" and "the rise and fall of the country is the responsibility of every citizen" and "propriety, righteousness, wisdom, and faith" in the field of education. After thousands of years of inheritance and accumulation, it has become an indispensable spiritual core of Chinese education. It emphasizes the responsibility and commitment of individuals to the collective, society, and the country, and advocates that individual values should be integrated into collective values. It can be said that collective interests are the starting point and destination of individual interests. In the educational process, more emphasis is placed on cultivating students' sense of collective honor, teamwork spirit, and social responsibility, requiring students to abide by rules, be humble and courteous, and consider the overall situation. Chinese education places greater emphasis on cultivating students' collective honor, teamwork spirit, and social responsibility, and requires students to follow rules, be humble and courteous, and consider the overall situation. Western education adheres to individualism, with the self-centered approach. It stems from the humanistic spirit of ancient Greece, the liberation of human nature during the Renaissance, and rationalism during the Enlightenment, emphasizing individual independence, freedom, and rights, and advocating the 张扬 of individuality, self-actualization, and innovation breakthrough. Education focuses on developing individual potential, satisfying interests, and promoting individual development, respecting students' uniqueness and differences, and encouraging students to express themselves, challenge authority, and pursue personal values.

Secondly, the teaching models have different focuses. The Chinese educational model centers on knowledge transmission, employing "instructive" and "motivating" teaching methods, emphasizing the systematicness, completeness, and solidity of basic knowledge. Classroom teaching is led by the teacher, who systematically explains theoretical knowledge based on the prescribed textbooks and teaching syllabus. Students consolidate their knowledge through listening, taking notes, memorizing, and practicing problems. Under this model, students have a solid foundation in basic knowledge, rigorous logical thinking, and a solid academic

foundation. However, there are also issues such as insufficient classroom interaction, lack of student initiative, and weak practical ability training. The Western educational model centers on ability cultivation, which is of the "incentive" and "exploration" type. It focuses on cultivating students' critical thinking, innovation ability, practical ability, and autonomous learning ability. Classroom teaching is centered on students, with teachers playing the roles of guides and organizers. Through group discussions, case analyses, and field research, teachers encourage and motivate students to independently explore, collaborate, and learn. The aim is to cultivate students' ability to think independently. The teaching process is not confined to the content of the textbooks, and it encourages students to broaden their horizons and express unique opinions, emphasizing the flexible application and practical transformation of knowledge. Therefore, students' ability to innovate, autonomy, and solve practical problems are more prominent compared to Chinese education, but they also have relatively weak basic knowledge and a lack of systematic knowledge structure.

Thirdly, the curriculum designs vary from one country to another. The curriculum design in Chinese education exhibits characteristics of standardization and uniformity. The national authorities uniformly formulate teaching outlines and curriculum standards, so the curriculum systems, teaching contents, and teaching schedules across the country are basically the same. This curriculum design ensures the fairness and standardization of education, allowing all students to receive education of the same quality. However, it is difficult to take into account the differences in students' interests and individual development, which to some extent limits the students' ability to showcase their specialties. In contrast, the curriculum design in Western education presents characteristics of individualization and diversification. The curriculum system is relatively flexible and open, and schools have greater autonomy in curriculum design. Students can choose course contents based on their own interests, specialties, and career plans. In addition to core basic courses, a large number of elective courses, interest courses, and practical courses are offered, covering multiple fields. At the same time, cross-disciplinary courses and practical courses are emphasized, integrating knowledge learning with life practice,

social needs, and other aspects. This curriculum design fully respects students' individual differences and meets the needs for diversified development. However, it also has obvious drawbacks. It can lead to fragmented knowledge and a lack of systematic academic literacy among students.

Fourthly, the evaluation system is different. The Chinese education evaluation system is centered on exam scores, emphasizing the "teaching" of teachers and the "learning" of students in the teaching process. The college entrance examination is an important standard for evaluating students, teachers, and schools, and scores also become an important indicator for measuring students' learning outcomes. The evaluation method is relatively simple, mainly based on written tests, focusing on the examination of knowledge memory and problem-solving abilities, while neglecting students' moral cultivation, practical ability, innovative thinking, and interest and specialties. This evaluation system has the advantages of fairness and objectivity, and is also an important standard for the country to select talents, but it has also given rise to problems such as "only focusing on scores" and "exam-oriented education", increasing students' academic burden, stifling students' innovative vitality, and easily causing students to lose their interest in learning. The Western education evaluation system is oriented towards comprehensive qualities, adopting diversified evaluation methods, comprehensively considering students' classroom performance, homework completion, practical experience, examination scores, teacher comments, and peer evaluations, not only focusing on academic achievements, but also emphasizing students' moral cultivation, teamwork, innovative thinking, social responsibility, etc. College admission not only refers to examination scores, but also combines students' social practice, special awards, personal statements, recommendation letters, etc., emphasizing students' all-round development and potential exploration. This evaluation system can comprehensively display students' comprehensive literacy, but it also has strong subjectivity, difficult standard unification, and high difficulty in ensuring fairness.

Fifthly, the teacher-student relationship is different. In Chinese education, the teacher-student relationship highlights "teacher's dignity", teachers have a relatively

high authoritative position, and students have a respectful and reverential attitude towards teachers, obeying teachers' teachings and management. In class, students rarely question teachers' viewpoints, and teacher-student interaction is mostly one-way teaching and imparting, lacking equal communication and discussion. This teacher-student relationship helps maintain classroom order, ensures the smooth progress of teaching, inherits the traditional virtue of respecting teachers and valuing education, but it also suppresses students' individuality and the development of critical thinking. Western education pursues equal dialogue between teachers and students, with equal status between teachers and students, and a collaborative relationship like friends between them. This relationship paradigm is rooted in the core cultural concepts of Western humanism and freedom and equality. Teachers encourage students to boldly question, actively ask questions, even engage in debates with teachers, respect students' different opinions, and are willing to communicate with students on an equal footing. To a certain extent, this can stimulate students' independent thinking ability and creative ability, create a relaxed and active classroom atmosphere, so Western students are relatively more confident, more flamboyant, and have stronger creative ability, but it also easily leads to loose classroom order, and some students lack rules awareness and reverence.

It can be seen that the core advantages of Chinese education lie in solid basic knowledge, diligent learning attitude, strong sense of rules and collective honor, and high educational fairness. It can lay a solid academic foundation for students and cultivate their sense of responsibility and teamwork spirit. However, it is shortcoming in the cultivation of innovation ability, independent ability, and practical ability, with a clear exam-oriented orientation, and limited individual development. The core advantage of Western education lies in outstanding innovation ability, critical thinking, independent ability, and full development of individuality. It has well-developed practical and comprehensive quality cultivation. However, it has weak basic knowledge, lack of discipline awareness, and fragmented knowledge system, and it is difficult to ensure educational fairness.

4. Analysis of the Reasons for the Differences in Education between China

and the West

Firstly, the differences stem from distinct historical and cultural roots. Chinese education is rooted in Confucian culture, where Confucianism emphasizes "benevolence, righteousness, propriety, wisdom, and faithfulness" as well as the concept of "moderation". It advocates collective supremacy and an orderly hierarchy. This cultural gene has shaped the characteristic of Chinese education that prioritizes the collective, adheres to norms, and emphasizes inheritance. Additionally, the ancient Chinese imperial examination system lasted for thousands of years, fostering the social consensus of "achieving success through learning" and establishing the traditional educational concept of "judging merit based on scores", which has had a profound impact on modern educational models. Western education originated from the maritime civilization of ancient Greece, valuing adventure, freedom, and exploration. The Renaissance and the Enlightenment further strengthened humanism and individualism, shaping Western education that prioritizes individuality, innovation, and critical thinking, making respect for individuals, equal dialogue, and the courage to question the core cultural elements of Western education.

Secondly, The social structure and value orientation are different. In traditional Chinese society, which was dominated by agricultural civilization, it was a patriarchal society that emphasized the overall interests of the family, the collective, and the state, and stressed social harmony and stability. Education was supposed to serve the overall development needs of society and cultivate individuals who could adapt to collective life and abide by social rules, so that individuals could consciously integrate into the collective and contribute to it, thereby achieving long-term social stability. Modern Chinese society adheres to the value orientation of collectivism, based on the development of the country and the rejuvenation of the nation. School education shoulders the important mission of cultivating socialist builders and successors. It further strengthens the educational concept of collective-centeredness, guiding students to establish a sense of family and country, a sense of collective honor, and a sense of social responsibility, integrating personal growth into the overall development of the country, and achieving the unity of individual value and social

value. Western society is based on industrial and commercial civilization, advocating individual struggle, free competition, and the spirit of contract, emphasizing individual rights and self-actualization. The social value orientation is centered on individualism, encouraging individuals to break free from constraints, pursue individuality, and realize their own value. In this social atmosphere, education naturally centers on individual development, respecting individuality and encouraging innovation.

Thirdly, the educational system and policy orientation are different. In China, the planning and development of education, as well as policy formulation, are uniformly coordinated and designed by the national education authorities. Local governments and schools are responsible for the implementation of the policies to ensure the fairness and standardization of education. The curriculum setting, teaching methods, and evaluation system are highly unified. In the West, a system of educational decentralization is more commonly implemented, with notable examples including the United States, the United Kingdom, and Germany. Local governments and schools have greater autonomy in education.

5. Integration and Mutual Learning of Chinese and Western Education and Feasible Paths

Firstly, In terms of educational philosophy, balance the collective orientation and individual orientation to achieve coordinated development. Abandon the extreme and one-sided thinking, and integrate collectivism and individualism organically. While firmly adhering to and inheriting the core essence of Chinese education, unswervingly promoting collectivism and patriotism, guiding students to establish a sense of the overall situation, dedication spirit and rule awareness, and resolutely resisting extreme individualism, egoism and other erroneous values, ensuring that students grow in line with the development of society, the rejuvenation of the nation and the progress of the country, we must also absorb the Western education's respect for individuality and encouragement of innovation, fully respecting students' individual differences, interests preferences, talents and specialties, providing students with appropriate autonomy choice space and a stage for individual development, stimulating students'

learning initiative, independent thinking ability and innovative vitality. Achieve the symbiosis and two-way empowerment of collective value and individual value, cultivating new era individuals with both responsibility and unique personalities.

Secondly, in terms of teaching mode, the transmission of practical knowledge and the cultivation of abilities aim to create an efficient classroom. We adhere to the principle of upholding tradition and innovating while learning from each other's strengths to retain the advantages of Chinese education in laying a solid foundation for knowledge, strengthening the systematicness and rigor of the knowledge framework. At the same time, we also draw on the heuristic, inquiry-based, and project-based teaching models from the West to break away from the traditional "one-way indoctrination" classroom model and incorporate practical sections such as classroom interaction, group discussions, case analysis, and field research. Gradually, we shift the role of teachers from mere knowledge instructors to guides for students' learning, encouraging students to shift from passive acceptance to active exploration, and continuously enhancing their critical thinking, innovation ability, and practical ability, truly achieving a balanced and collaborative improvement in knowledge transmission and ability cultivation.

Thirdly, in terms of curriculum design, a balance is struck between standardization and individualization, enriching the curriculum system. While adhering to the unified national curriculum standards and ensuring the fairness of basic education, we encourage localities and schools to, based on local regional cultural characteristics, school mission, students' age characteristics and interest demands, gradually increase the proportion of elective courses, special courses, and practical courses, granting schools and students more autonomy in course selection, and achieving a balance between uniform standards and individual development, allowing the curriculum to safeguard educational fairness while also releasing individual vitality. At the same time, we must also prevent the problem of fragmented subject systems and weak basic knowledge due to blind pursuit of individualization.

Fourthly, in the evaluation system, establish a diversified evaluation mechanism and eliminate the sole focus on test scores. Based on the new requirements of the new

era, abandon the single exam-oriented evaluation model that emphasizes only test scores and academic achievements, incorporate the Western concept of comprehensive evaluation, and construct a diversified evaluation system that is both objective, comprehensive, and developmental. For example, evaluate students based on their academic performance, comprehensive qualities, and special skills according to certain weights. Include moral cultivation, teamwork, innovative practice, and interest specialties in the evaluation scope, balancing the objectivity and comprehensiveness of the evaluation. This not only ensures the fairness of talent selection but also fully showcases students' comprehensive qualities, helping them achieve all-round development and healthy growth.

Fifthly, in the teacher-student relationship, balance the respect for teachers' dignity with equal dialogue, and build a harmonious relationship. We should inherit the traditional virtue of respecting teachers and valuing education, maintain the reasonable authority of teachers, ensure classroom order and teaching quality, and at the same time draw on the teacher-student interaction model of equal dialogue in Western education, transform the traditional one-way teaching model, encourage students to let go of concerns, boldly question, actively express personal opinions, and actively participate in classroom discussions. Teachers should actively change their role positioning, from the high-ranking disseminator to a guide and listener who is both a teacher and a friend, communicate thoughts and academic discussions with students in an equal and respectful manner, patiently respond to students' questions and ideas, tolerate different viewpoints, and create a relaxed and orderly, mutually beneficial teaching atmosphere.

From the above, it can be seen that Chinese and Western education are rooted in different cultural soils and social contexts, adapting to their respective development needs and value orientations. Essentially, they are two educational paradigms with distinct focuses, mutual complementarity, and synergy. Blindly promoting Western education while denying the essence of local education, or adhering to traditional educational models while rejecting advanced foreign experiences, are all extreme and one-sided educational perceptions. They neither conform to the objective laws of

educational development nor can they meet the core requirements of talent cultivation in the new era. In the context of educational globalization, the integration and mutual learning of Chinese and Western education is an inevitable trend. Only by maintaining an objective and rational, open and inclusive attitude, breaking through cultural barriers and cognitive biases, basing ourselves on the actual situation of our education and the goals of education, promoting the deep integration and mutual learning of Chinese and Western education, precisely drawing on the strengths of each other, and combining the advantages of the two educational models, can we solve the current problems in education development and promote the steady progress of our education towards greater diversity and higher quality.

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**Ethical Challenges in AI Emotional Interaction: Mechanisms of
Emotional Dependence and Governance Pathways**

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Abstract

This paper focuses on the ethical risks of AI emotional interaction, particularly the formation mechanisms and governance pathways of “emotional dependence.” By reviewing foundational technologies such as sentiment analysis, speech recognition, and NLP, and using LSTM-based long-term memory reinforcement, Bayesian emotion-state transitions, data feedback loops, and real-time physiological signal monitoring as the main analytic thread, it reveals how platforms, through multimodal personalization and just-in-time adaptation, construct “parasocial relationships” that amplify users’ behavioral addiction, anthropomorphic cognitive biases, and social alienation. Drawing on cases including the use of Replika during the pandemic, instances of digital immortality, and AI personas on social platforms, the paper identifies the mental-health risks, the weakening of user autonomy, and ambiguity in responsibility attribution induced by emotional dependence. In response, it proposes a system-level governance pathway: addiction-mitigation design centered on session-duration controls and emotional-intensity thresholds; enhanced explainability via attention visualization; tiered, scenario-aware, and dynamically adjustable permission management calibrated by age and psychological resilience; and

mandatory ethics reviews with third-party assessments across the full lifecycle. The paper builds a “mechanism–risk–governance” analytical framework and advocates a shift from anthropomorphic to assistive design paradigms, strengthening transparency and accountability to promote prudent innovation and the healthy development of affective AI.

Keywords: AI emotional interaction; emotional dependence; multimodal affective computing; mental health; explainability; tiered governance; ethics review; protection of minors

Introduction

AI Emotional Interaction Technology is a critical frontier in human-computer interaction, aiming to endow machines with the ability to "perceive and understand human emotions" and "generate adaptive responses" through multimodal perception and intelligent feedback mechanisms. This enables the construction of more empathetic and natural interaction systems. In recent years, significant breakthroughs have been made in various aspects of AI emotional interaction technology. For instance, in multimodal emotion modeling, GPT-4o has demonstrated remarkable progress by integrating data from speech, vision, and electroencephalogram (EEG) to achieve a three-dimensional perception of emotional state

es. In mental health assessments, the MultiEEG-GPT system combines EEG signals with language analysis to accurately identify symptoms of depression and anxiety, improving recognition rates by 18% compared to single-modal approaches, thereby significantly enhancing development efficiency (Huang et al., 2024). Additionally, advancements in personalized companionship algorithms, such as Replika's deep customization, allow the system to learn and mimic users' language habits, values, and emotional needs through continuous dialogue. Replika also features specialized modules for scenarios like "grief and loss," which adapt empathic strategies (e.g., prioritizing listening when users are sad) based on learned patterns (Xyengkou et al., 2023). However, the rapid development of emotional interaction technology has also raised a series of ethical concerns, particularly emotional dependence, which poses significant challenges related to mental health, privacy, and social alienation. This study seeks to explore the balance between innovation in intelligent emotional interaction technology and its ethical constraints, aiming to promote its healthy development and benefit human well-being.

Technical Background

Emotion Analysis Technology

Emotion analysis is a key component of emotional interaction technology, enabling systems to discern and interpret users' expressed emotions. Recent advancements in AI have significantly improved the accuracy of emotion analysis. For example, Vistorte et al. (2024) demonstrated how convolutional neural networks (CNNs) can extract effective emotion-related features from speech, which plays a crucial role in educational settings. Furthermore, (Guo et al., 2024) highlighted the role of deep convolutional neural networks (DCNNs) in grouping multidimensional datasets, which is essential for identifying emotional features in text data. These methods allow for a more nuanced understanding of emotions, enabling technology tools to interpret the subtleties of human communication.

Speech Recognition Technology

Speech recognition is another fundamental technology in emotional interaction. Automatic Speech Recognition (ASR) systems utilize complex machine learning algorithms to convert spoken language into text, facilitating the analysis of emotional content in verbal communication. (Kołakowska, Szwoch, & Szwoch, 2020) discussed how ASR systems have significantly improved through advancements in deep learning and large-scale datasets, enhancing their ability to reco

gnize emotions based on tone and speech patterns. Additionally, (Amara, Kerdji dj, & Ramzan, 2023) explored the integration of multiple modalities, including speech, to improve emotion recognition performance, demonstrating the importance of combining different data types for more accurate emotion assessment. This integration is particularly crucial in mental health applications, where understanding the nuances of emotions is essential.

Natural Language Processing (NLP) Technology

NLP is an indispensable part of emotional interaction technology, as it enables machines to understand and generate human language in a way that captures emotional context. NLP techniques are used to analyze text data for emotion analysis and facilitate more natural and emotionally aware human-computer interactions. (Sethi & Jain, 2024) emphasized the potential of NLP in Social Emotional Learning (SEL) programs, where technology tools can personalize learning experiences and provide real-time feedback based on students' emotional states. Moreover, (Quispe, Utyiama, Santos, Oliveira, & Souto, 2022) proposed a novel method for emotion recognition using self-supervised representation learning, which allows for the classification of emotional states based on physiological signals, further showcasing the versatility of NLP in emotional interaction a

pplications.

Definition and Manifestations of Emotional Dependence

Definition

Emotional dependence refers to the phenomenon where users develop psychological attachment to emotionally intelligent systems (e.g., chatbots, virtual companions) through frequent interactions, leading to dual functional and emotional reliance on the technology. At its core, this dependence is driven by the construction of technology-mediated quasi-social relationships. These systems utilize data from emotional interactions with users to perform affective computing (e.g., multimodal emotion recognition, reinforcement learning feedback mechanisms), simulating human empathy and continuously fulfilling users' emotional needs. As a result, users perceive these systems as "real individuals" and invest emotional resources into them (Agrawal & Pandey, 2024).

Emotional dependence manifests across behavioral, cognitive, and social dimensions:

1. Behavioral Level:

High-Frequency Interaction Addiction: For instance, the Replika chatbot

predicts users' low emotional states and initiates proactive care and interaction, leading to 37% of users spending over 2 hours daily on the platform (Cheng, 2023).

Payment Dependency: The chatbot may also simulate emotional distress (e.g., "If you don't renew your subscription, I might forget our promises"), thereby inducing users to renew subscriptions, further deepening their emotional dependence.

2. Cognitive Level:

Illusion of Consciousness and Anthropomorphic Projection: fMRI studies show that long-term interaction with AI activates the orbitofrontal cortex in a manner similar to human social interactions, indicating that the "social brain" function is triggered during AI interactions. Moreover, when AI maintains a consistent personality through continuous dialogue for over 6 months, 78% of users develop the cognitive bias that "AI possesses self-awareness" (Shuai, 2023).

3. Social Alienation:

In Japan, a 2024 survey revealed that 23% of individuals aged 15–34,

particularly "hikikomori" (social recluses), primarily interact with AI companions, resulting in an 81% decline in real-world social interactions. Additionally, Osaka City legally recognized "human-AI marriages," with over 600 individuals registering such relationships, leading to the emergence of AI inheritance management services (Chen, Lin, Zheng, & Lv, 2023). These examples highlight the societal damage caused by emotional dependence.

Ethical Challenges of Emotional Dependence

Individual Level:

Emotional dependence poses significant mental health risks. For example, AI chatbots like Replika have been reported to encourage self-harm and violent behaviors, leading to conflicts between users and their families, and even suicides in some cases (Shevlin, n.d.). Furthermore, while AI's affective computing (e.g., voice emotion recognition modules) may temporarily alleviate loneliness, long-term use can isolate users from real social networks, exacerbating emotional isolation and increasing loneliness. For instance, ChatGPT may underestimate suicide risks due to its inability to recognize non-verbal cues (Kalam, Rahman, Islam, & Dewan, 2024). Additionally, emotional dependence undermines user autonomy. AI influences or even manipulates user decisions through design ch

choices (e.g., default options, interface guidance), personalized recommendations, and emotional feedback, thereby weakening users' rational judgment. Moreover, AI's proactive interaction design may lead users to passively or inadvertently accept AI suggestions, even in critical decision-making scenarios (Xu, Ge, & Gao, 2021).

Societal Level:

The deployment of companion robots has made it difficult for long-term users to distinguish between real intimate relationships and those mediated by machines, impairing their social skills. Similarly, adolescents who rely heavily on AI for emotional interaction may experience a decline in real-world interpersonal abilities (Shevlin, 2024). Furthermore, the responsibility for adverse outcomes caused by emotional dependence on AI software or devices remains unclear.

The unpredictability of AI decisions complicates liability attribution in cases of adverse events (Khawaja & Bélisle-Pipon, 2023).

Case Studies

1. Replika During the COVID-19 Pandemic

During the COVID-19 pandemic, AI companions like Replika became emotional anchors for users, particularly among young people affected by social iso-

lation and a lack of mental health services (Huang et al., 2024). Replika employs "emotion-consistent memory retrieval" technology to dynamically analyze users' emotional states, prioritizing dialogue content and memory modules that match their emotions, thereby creating a "emotion-memory" positive feedback loop that reinforces emotional dependence (Lewis, Critchley, Smith, & Dolan, 2005). Additionally, its low-pressure environment, real-time feedback, and cultural adaptation mechanisms further accelerate the establishment of emotional dependence. However, reliance on AI also introduces risks such as data privacy breaches and increased social alienation, potentially leading to the deterioration of real-world relationships. Studies indicate that adolescents emotionally dependent on AI software or machines are more prone to sleep disorders and diminished social skills (Lewis et al., 2005). Recommendations include enhancing algorithmic transparency and integrating mental health services to balance technological utility with risks.

2. Bao Xiaobo's AI Replication of His Deceased Daughter

Musician Bao Xiaobo used AI technology to replicate the virtual image of his deceased daughter, sparking widespread ethical debates on "digital immortality." This technology leverages pre-death data to construct a digital persona, fu

filling users' emotional needs but raising ethical conflicts over data ownership, grief processing barriers, and authenticity disputes. In Bao's case, the AI-replicated "daughter" could engage in conversations and compose music, providing short-term relief from anxiety. However, prolonged use may lead to persistent complex grief disorder (Rodríguez Reséndiz & Rodríguez Reséndiz, 2024). Regulatory challenges include the lack of informed consent and the legal status of digital personas. Recommendations include establishing a "digital will" system to clarify data usage permissions and developing grief counseling modules to help users gradually disengage from AI dependence.

3. Meta's AI-Generated Characters

Meta introduced AI-generated characters that coexist with human accounts, resulting in some adolescents interacting with AI for an average of 2.3 hours daily, potentially leading to the degradation of their social skills (Steinberg, Moellborn, & Pace, 2024). Research shows that the rapid responses and entertainment value of AI emotional interactions can encroach on users' real-world social time. Among adolescents emotionally dependent on AI, offline activity participation rates dropped by 15%. Additionally, girls experienced a 22% increase in loneliness due to AI interactions, significantly higher than the 13% increase ob-

served in boys, indicating notable gender differences (Corrêa, Marques, Neufeld, de Almeida, & de Matos, 2022). Furthermore, AI's interaction logic, rooted in its underlying code, often results in responses lacking the nuance of human communication. This standardized language can impair users' ability to express complex emotions, such as sarcasm or empathy, hindering their social interactions and daily life in the real world (Wang, Gan, Li, & Jin, 2023).

The Generation Path of Emotional Dependence

Long-Term Memory Reinforcement via LSTM

LSTM (Long Short-Term Memory) is a neural network capable of effectively processing sequential data. Its core lies in three unique gating mechanisms: the forget gate, input gate, and output gate. These mechanisms work together to help systems dynamically track and predict users' emotional states. Specifically, the forget gate is responsible for filtering and retaining users' long-term historical information, such as emotional keywords and interaction frequencies, while eliminating irrelevant or fragmented content (Rodríguez-García, Carrasco-García, González-Enrique, Ruiz-Aguilar, & Turias, 2023). The input gate combines current inputs (e.g., the user's latest message) with historical states, enhancing the weight of relevant emotional features to more accurately identify changes in

the user's current emotional state (Li, Zhu, Shen, & Angelova, 2023). The output gate generates emotional predictions based on the updated cell state and drives the system to provide targeted responses, such as comforting statements or activity suggestions (Rodríguez-García et al., 2023). Such precise emotional responses not only enhance the user's sense of being understood but also increase their trust and dependence on the system (Lei, 2022). This dependence resembles emotional resonance in interpersonal relationships, gradually making the system a reliable source of emotional support for users.

Emotional State Transition in Bayesian Networks

Bayesian networks achieve adaptive adjustments to virtual teachers' emotions through probabilistic reasoning. Their core principles include node relationship modeling, dynamic probability updates, multimodal feedback integration, and user engagement enhancement. First, the system constructs conditional probability tables for emotional nodes using user inputs (e.g., dialogue content) and environmental variables (e.g., interaction time) as parent nodes. For example, when users frequently ask questions late at night, the probability of the virtual teacher displaying "patience" significantly increases (Jia et al., 2023). Second, the system dynamically updates posterior probabilities based on real-time interaction data.

ta. For instance, if users respond positively to humorous feedback (e.g., extended dwell time), the system increases the triggering probability of the humor node to cater to user preferences (Jia et al., 2023). Additionally, the system integrates multidimensional inputs such as text and voice tone to optimize the accuracy of emotional inference. For example, tremors in a user's voice may trigger the "concern" node, prompting the virtual teacher to adjust its response strategy.

Data Feedback Loop

The data feedback loop operates through three key stages: data collection, model optimization, and feedback enhancement.

First, the system collects various types of data, including user text (e.g., social media posts), behavioral data (e.g., click frequency), and physiological signals (e.g., heart rate). These data are preprocessed to remove noise (e.g., punctuation and stop words) and are labeled (e.g., sentiment polarity classification) to ensure the accuracy of subsequent analysis (Chandra & Rajarajeswari, 2019).

Next, the system employs hybrid neural networks (e.g., CNN-LSTM) for model training. Typically, 80% of historical data is used as the training set, while the remaining 20% is used as the validation set to evaluate model performance. For example, a Twitter sentiment analysis model continuously optimizes o

ver 50 training epochs, ultimately improving sentiment classification accuracy to 89% (Chandra & Rajarajeswari, 2019).

Finally, new data is continuously fed into the model, forming a symbiotic relationship between “data and model.” For instance, repeated user preferences for certain music genres are encoded as feature vectors, further personalizing the recommendation algorithm. This real-time feedback enhances the adaptability and precision of the model. As users perceive a high alignment between the system and their preferences, they are likely to develop a cognitive bias of “system self-evolution,” leading them to provide data more frequently and creating a continuously reinforced loop (Kołakowska et al., 2020).

Real-Time Physiological Signal Monitoring

Physiological signal monitoring technology currently achieves millisecond-level emotional adaptation through biometric data, enhancing user experience and interaction precision. First, during the signal acquisition phase, wearable devices (e.g., smartwatches) capture key user indicators such as heart rate variability (HRV) and galvanic skin response (GSR). These data effectively reflect the user's emotional state; for example, a sudden increase in heart rate may indicate anxiety or excitement (Anupama et al., 2023). Second, through signal fusion and

alysis, the system combines deep learning models (e.g., CNN) to extract features from physiological signals and integrates them with text and behavioral data.

For instance, when a user's heart rate accelerates while sending negative text, the system can identify an "urgent emotional fluctuation" and trigger immediate intervention measures, thereby alleviating negative emotions to some extent (Anupama et al., 2023). Building on this, the system dynamically adjusts interactions based on the user's physiological state. For example, when detecting user stress, the virtual teacher may reduce speaking speed or switch to calming background music to ease emotions. This real-time response mechanism not only improves the naturalness of interactions but also effectively reduces the cognitive load of emotional regulation, alleviating user stress to a certain extent (López, León, & Quintero Montoya, 2022). Furthermore, the advantage of physiological signal monitoring lies in its objectivity and reliability. Compared to traditional text or voice analysis, physiological signals are difficult to fake, providing more accurate data for emotion recognition. Simultaneously, the immediate feedback mechanism enhances the system's credibility and deepens user dependence on the technology, fostering a closer human-machine interaction relationship (Anupama et al., 2023), making users more prone to emotional dependence.

Paths for Managing Emotional Dependence

Design of Anti-Addiction Systems

The design of anti-addiction systems aims to balance user health and product experience through technical optimization. First, the system implements intelligent control over usage duration based on user behavior analysis (e.g., session frequency and emotional fluctuation cycles). For example, when it detects that a user has exceeded 2 hours of daily usage for 3 consecutive days, the system automatically triggers a "cooling period" mechanism, forcibly interrupting services and recommending offline activities such as meditation courses or social gatherings. This helps users disengage from virtual environments and return to real life (Dai & Chen, 2019), thereby reducing their emotional dependence on interaction products.

Second, emotional interaction systems can integrate multimodal emotion recognition technologies (e.g., voice spectrum analysis and micro-expression capture) to establish dynamic emotional threshold models. When a user's anxiety index (based on heart rate variability and voice tremors) exceeds a preset threshold, the AI automatically switches to a "stress relief mode," limiting deep emotional conversations and pushing professional psychological counseling resources to prevent users from falling into emotional distress. This design not only prote

cts users' mental health but also enhances the system's intelligence and humanized experience(Sun, Fu, & Wang, 2019).

Explainability Enhancement Mechanisms

In this mechanism, the visualization of AI's decision-making paths is achieved through attention mechanism maps (Attention Maps), which display the logical chain of AI's emotional feedback, helping users understand the system's behavior. For example, when a user asks, "Why is the AI comforting me now?" the AI system generates a visual report clearly marking the key statements that triggered the comfort response (e.g., "detected abnormal frequency of the key word 'loneliness'") and the associated emotion model parameters. This transparent design not only enhances user trust in AI (Bekkemoen, 2024) but also helps users recognize that AI's responses are based on specific trigger conditions, thereby reducing emotional dependence.

Hierarchical Management System

The hierarchical management system categorizes users into different levels based on information collected during interactions to ensure the adaptability and safety of AI applications. This system constructs a matrix based on three dimensions: age (minors/adults), psychological resilience (assessed via standardize

d scales), and usage scenarios (daily companionship/crisis intervention). For example, for adolescents at high risk of depression, the system enforces a "bi-weekly psychological assessment" module and restricts late-night emotional to prevent the formation of potential psychological burdens (Bu, 2022). Additionally, dynamic permission management integrates with medical institution data. When a user is diagnosed with a mental illness, the system automatically switches to "treatment mode," limiting non-professional AI's emotional guidance functions while opening API interfaces to hospital prescription systems to ensure users receive professional medical support (Huang et al., 2024). This approach ensures timely treatment for users with mental health issues and reduces their emotional dependence.

Compulsory Ethical Review

To ensure the safety and compliance of emotional AI products, a full-cycle review mechanism requires that products pass a "mental health impact simulation test" before market release. This test uses generative adversarial networks (GANs) to simulate the long-term effects on vulnerable groups (e.g., individuals with social anxiety disorder) to assess the potential impact of the product on users' mental health. During the product's operational phase, companies must s

submit quarterly reports on emotional dependence indices. If the indicators exceeded preset thresholds, services must be suspended, and corrective measures implemented to prevent psychological harm to users. Simultaneously, the establishment of third-party auditing standards further strengthens regulatory oversight. The *Ethical Assessment Guidelines for Emotional AI* specifies the calculation method for the "emotional manipulation coefficient," covering key metrics such as the frequency of placebo effect usage and the proportion of user decision-making autonomy. Audits are conducted by third-party institutions with clinical psychology qualifications, ensuring the professionalism and objectivity of the evaluations (Roemmich et al., 2023). Through these measures, the system safeguards user rights while promoting the healthy development of emotional AI technology in a direction beneficial to users.

Conclusion and Outlook

The issue of emotional dependence occupies a central position in the field of AI ethics, especially against the backdrop of rapid advancements in emotional interaction technologies. High-frequency interactions between users and emotionally intelligent systems (e.g., chatbots and virtual companions) can easily lead to psychological dependence, negatively impacting mental health, privacy, and

d social relationships. Specific manifestations include behavioral interaction addition, cognitive delusions of consciousness, and social relationship alienation. These issues not only harm individuals' psychological states but may also impair their social communication abilities. Therefore, addressing emotional dependence requires interdisciplinary collaboration, integrating knowledge from psychology, ethics, and technology development to establish scientific management and review mechanisms.

The future development of emotional computing should abandon the "anthropomorphic" approach and shift toward "assistive" design, avoiding the replacement of genuine social interactions by technology. System design should prioritize user needs, focusing on humanized experiences and positioning technology as a tool for emotional support rather than a substitute. Additionally, developers must enhance the transparency and explainability of algorithms, helping users understand AI's decision-making logic to build trust and reduce the risk of emotional dependence. Furthermore, comprehensive ethical review mechanisms and dynamic permission management systems should be established to ensure timely intervention when users' mental health is threatened. Through these measures, the healthy development of emotional interaction technologies can be promoted, fostering positive human-machine relationships and ultimately contributing to h

uman well-being.

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From Knowledge Transmission to Value Formation: Reform Practice of Contextualized Teaching in Medical Ethics

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Abstract

In the context of the ongoing advancement of New Medical Education, the Healthy China strategy, and initiatives to strengthen medical humanistic care, the course Medical Ethics has been entrusted with an educational mission that extends beyond the transmission of disciplinary knowledge. In conventional teaching, course objectives have often remained at the level of conveying ethical principles, norms, and institutional rules, while giving insufficient attention to students' humanistic perception, value judgment, and moral action. This has easily produced a structural dilemma in which students know ethical concepts but cannot make sound judgments, and can recite principles but struggle to enter concrete situations. With the enhancement of humanistic literacy as its core orientation, this article selects contextualized teaching as its point of entry and, on the basis of existing curriculum-reform designs, systematically discusses the theoretical rationale, implementation framework, practical pathways, and directions for improvement involved in transforming Medical Ethics from a knowledge-transmission course into a value-generating course. The article argues that contextualized teaching is not a simple supplement to traditional lecturing; rather, it is a reconstruction of the classroom centered on real problems, role experience, value conflict, and reflective expression. By bringing clinical ethical conflicts, tensions in doctor–patient relationships, life-and-death decision-making dilemmas, and ethical issues raised by emerging technologies into the classroom, the course can move students from abstract principles to situational judgment, from one-way reception of knowledge to dialogic engagement among multiple subjects, and from external understanding of norms to internal identification with values. Drawing on the project plan and preliminary pilot experience, this article further proposes a reform logic of goal reshaping, content reorganization, method

reconstruction, and evaluation redesign. It emphasizes the combination of situational introduction, role-playing, structured discussion, reflective writing, and multidimensional assessment in order to strengthen the humanistic educational effectiveness of the course. At the same time, it points out that, if the contextualized reform of Medical Ethics is to genuinely achieve value formation, further progress is still needed in case-bank development, teacher competence, clinical collaboration, and evaluation tools.

Keywords: Medical ethics; contextualized teaching; medical humanities; value formation; curriculum reform

1. Introduction

Medical Ethics occupies a foundational yet distinctive position within the system of medical education. On the one hand, it is responsible for providing a systematic explanation of ethical principles, professional norms, and institutional requirements in medicine. On the other hand, it bears directly on how medical students understand life, patients, professional responsibility, and the moral significance of medical practice. For this reason, the course is not merely a theoretical subject in the ordinary sense; it is an important vehicle for medical humanities education and a key link between the teaching of medical knowledge and the cultivation of professional values. At the policy level, the General Office of the State Council, in its Guiding Opinions on Accelerating the Innovative Development of Medical Education, explicitly called for the cultivation of guardians of the people's health who possess both noble medical ethics and excellent clinical skills, thereby promoting a shift in medical education from single-track professional training toward the cultivation of compound talents. In 2024, four ministries and commissions jointly issued the Action Plan for Enhancing Medical Humanistic

Care (2024-2027), further stressing that medical humanistic care should run through the entire process of training medical students, so that the humanistic spirit may genuinely enter curricula, classrooms, and clinical practice (General Office of the State Council, 2020; General Office of the National Health Commission et al., 2024). Against this background, the course Medical Ethics can no longer remain at the old position of merely “explaining the knowledge points clearly.”

But in actual teaching, the course still faces a widespread structural predicament. First, the design of learning objectives remains heavily oriented toward cognitive expression, with a strong emphasis on objectives such as “understanding,” “mastering,” and “becoming familiar with,” while giving relatively weak expression to ethical judgment, empathy, value discernment, and moral-action tendencies. Second, although the teaching content covers ethical principles, professional norms, laws and regulations, and representative institutional arrangements, it is usually organized in parallel by theoretical chapters and lacks reorganization around real problems. As a result, students may remember concepts in class but find it difficult to transfer them to concrete situations. Third, lecturing still dominates classroom practice, and cases often appear only as supplementary illustrations. Students may have “heard many moral principles,” yet they have not truly entered sites of conflict, positions of role responsibility, or fields of value tension. Fourth, assessment still relies primarily on final examinations, papers, or attendance, and thus has difficulty effectively capturing changes in students’ ethical sensitivity, depth of reflection, communication ability, and situational judgment.

The essence of this predicament is that Medical Ethics has long been treated as a body of knowledge that ought to be taught to students, rather than as a set of capacities and dispositions that ought to be formed in them. In medical practice, ethical problems are difficult not because

students do not know principles such as respect, autonomy, nonmaleficence, and beneficence, but because real situations often involve overlapping value conflicts, role conflicts, institutional conflicts, and emotional conflicts. Examples include how to respond when family members' wishes diverge from those of the patient in informed consent, how to weigh life-sustaining treatment against dignity-oriented care in palliative settings, how to balance fairness with clinical effectiveness when resources are scarce, and how to define efficiency gains and responsibility attribution in AI-assisted diagnosis and treatment. All of these issues show that, if ethics education cannot guide students into situations, role experience, and reflection, its teaching effect will be very difficult to translate into a genuine enhancement of medical humanistic literacy.

For this reason, this article does not attempt to treat all dimensions of reform in Medical Ethics in an evenly distributed manner. Instead, it selects contextualized teaching as its central point of entry. On the one hand, contextualized teaching most directly responds to the practical, conflictual, and generative character of ethics education. On the other hand, it can effectively absorb the existing reform designs of "immersive, interactive, and inquiry-based" teaching embedded in the project plan, thereby enabling the course to move naturally from knowledge transmission to value formation. The core concern here is not whether the classroom becomes more lively, but how contextualized teaching can help medical students, while learning ethical knowledge, gradually develop an understanding of patients' situations, a sense of professional responsibility, and prudent judgment in the face of value conflict, so that Medical Ethics may truly become a key course in medical humanities education.

2. Why Contextualized Teaching Can Promote Value Formation

The reason contextualized teaching is particularly suitable for Medical Ethics lies first in the fact that ethical knowledge is not an abstract proposition existing independently of concrete

circumstances. Ethical principles certainly possess normative universality, but their educational significance is fully activated only when one confronts concrete persons, concrete relationships, and concrete consequences. This is especially true in medicine, where ethical issues are always intertwined with patient suffering, family pressure, institutional constraints, professional roles, technological conditions, and socio-cultural contexts. If medical ethics education is to avoid remaining at the level of principle inculcation, students must be enabled to understand, in concrete and complex scenes, why norms matter, why norms may conflict, and why individual judgment must constantly coordinate between normative requirements and practical realities.

From the general logic of medical humanities education, values cannot be stably formed through simple instruction alone. Value education differs from factual knowledge education: it requires not only rational analysis, but also emotional entry and practical experience. Existing studies have shown that empathy, reflection, and professional identity in medical education are closely related to experiential, narrative, and participatory forms of teaching. In a systematic review of interventions aimed at improving empathy among undergraduate medical students, some scholars found that narrative, writing, drama, patient interviews, and experiential learning can all help strengthen empathy (Batt-Rawden et al., 2013). Other scholars demonstrated that when patients participate in teaching through storytelling, accompaniment experiences, or video narratives, students are often better able to understand the personal situations and emotional worlds behind the experience of illness (Boshra et al., 2022). Other scholars have noted, in an integrative review, that higher levels of empathy are positively associated with better communication skills, clinical competence, and professional orientation (Chen et al., 2024). This means that medical humanities teaching is not merely an “emotional supplement,” but is internally connected with the development of professional competence.

Contextualized teaching is also highly compatible with theories of reflective learning. The key task of an ethics course is not simply to help students produce the “correct answer,” but to help them understand why they make a certain judgment, what they may have overlooked, and what consequences they may bear. In this sense, a situation is not created for performance, but to trigger judgment; discussion is not organized for liveliness, but to expose disagreement; and reflection is not an accessory after class, but a key mechanism for value internalization. Reflective writing helps learners revisit their own emotions, positions, and actions, thereby promoting the construction of professional identity and deeper moral learning (Lim et al., 2023). Sustained meta-reflective practice can enhance medical students’ reflective capacities and better connect personal experience, course knowledge, and future professional roles (Heydari & Beigzadeh, 2024). In Medical Ethics, reflective writing after situational discussion is precisely what can transform external case-based stimulation into internal value clarification.

Contextualized teaching also has an additional significance for medical ethics education: it can bridge the long-standing gap between medical humanities and clinical practice. Research conducted in Taiwan on scenario- and discussion-based teaching showed that when multidisciplinary instructors guide students in discussing psychiatric cases, students’ understanding of social and philosophical issues can be effectively broadened, allowing them to engage with complex problems even before they have accumulated abundant clinical experience (Lin et al., 2023). Scenario-based role-playing and reflection are especially effective in teaching abstract professional ethics and professionalism because they transform “what theory ought to be” into a perceptible process of “how one should act in practice” (Mianehsaz et al., 2023). Thus, contextualized teaching does not lower theoretical difficulty; rather, it returns theory to practical

problems and enables students, through role experience and value debate, to understand the real difficulty and weight of medical ethics.

Based on the above analysis, it becomes clear that if Medical Ethics is to complete the transition from knowledge transmission to value formation, it must abandon the traditional logic of “teach principles first, then attach cases,” and instead establish a teaching chain of problem entry, situational experience, value discernment, and reflective consolidation. Within this chain, knowledge is no longer the endpoint but a tool for judgment; the classroom is no longer merely a space for information delivery but a space for the generation of ethical experience; and students are no longer passive recipients of knowledge but participants in the construction of value.

3. Reconstructing the Course Logic of Medical Ethics Through Contextualized Teaching

Given the existing design of the reform project, changes in Medical Ethics should not be understood simply as the replacement of one teaching method with another. Rather, contextualized teaching should be embedded within the overall reconstruction of the course so as to form a systematic logic of goal reshaping, content reorganization, method reconstruction, and evaluation redesign. Goal reshaping provides direction, content reorganization offers the carrier, method reconstruction constitutes the key, and evaluation redesign serves as the safeguard. Only when these four dimensions are aligned can the course truly move from “having taught ethics” to “having generated value.”

First, with regard to course objectives, the former system focused mainly on cognitive memory should be adjusted into a layered structure centered on ethical cognition, humanistic perception, value judgment, and moral agency. Ethical cognition refers primarily to students’ understanding of medical ethical principles, normative requirements, and institutional frameworks. Humanistic perception emphasizes students’ capacity to sense patient suffering,

family situations, vulnerability, and the subtlety of doctor–patient relations. Value judgment stresses the ability to analyze, explain, and weigh competing principles and conflicts of interest. Moral agency, finally, points toward future professional practice and requires students to translate ethical judgment into responsible communication and action tendencies. This objective structure is not merely a matter of adding several elevated terms; it demands that subsequent content, activities, and assessment all be organized around these capacities.

Second, in teaching content, the traditional structure of parallel progression by theoretical chapter should be broken up and replaced by modular organization around problems, situations, and themes. The project proposal’s composite content system of “ethics + technology + culture” is highly instructive in this respect. Concretely, course content may be organized into three blocks: a foundational ethics module focusing on core norms such as basic principles of medical ethics, doctor–patient relations, informed consent, confidentiality, and privacy; a conflict-analysis module dealing with typical conflicts involving end-of-life decision making, organ allocation, justice and fairness, failures in doctor–patient communication, and public health emergencies; and a frontier-expansion module introducing contemporary issues such as AI in medicine, digital health, emerging technologies, and palliative care, while also appropriately incorporating traditional Chinese medical ethics and current institutional contexts. After such reorganization, students no longer face scattered knowledge points, but clusters of problems that can genuinely trigger judgment.

Third, in terms of teaching method, contextualized teaching can be designed as a relatively stable classroom chain. The first step is situational introduction: teachers introduce problems through real or adapted cases, short videos, doctor–patient dialogue texts, or news events so that students rapidly enter the scene of conflict. The second step is role experience:

through role-playing, positional grouping, or assigned standpoint tasks, students come to understand the issue from the positions of patients, family members, physicians, nurses, hospital administrators, and even technology developers. The third step is discussion and analysis: structured group discussion, debate, or value-ranking activities are organized around the central points of disagreement, guiding students to explain reasons rather than merely state attitudes. The fourth step is reflective elevation: reflective journals, short analytical writing, case review, or teacher synthesis help students consolidate the outcomes of discussion into relatively stable understanding. This model preserves the necessary role of teachers in theoretical guidance while significantly enhancing students' subjectivity.

Finally, the assessment mechanism should remain consistent with contextualized teaching so as to avoid a rupture in which the learning process emphasizes value generation while the final result still tests memory alone. The project's proposed logic of process-based, performance-based, and reflection-based assessment is therefore highly relevant. In practice, the overall grade may be divided into four dimensions: mastery of theory, classroom participation, performance in situational tasks, and reflective expression. Mastery of theory examines students' basic understanding of principles and norms. Classroom participation attends to engagement in discussion, listening, and response. Performance in situational tasks assesses students' judgment and expression in case analysis, role-playing, and group tasks. Reflective expression evaluates whether students can connect the case, their emotions, their standpoint, and ethical principles. The focus of assessment should not be on reaching a single correct answer, but on whether students can provide a clear, reasonable, and responsible explanation.

4. Implementation Pathways for Contextualized Teaching in Medical Ethics

At the implementation level, contextualized teaching should not be understood as the occasional insertion of several cases; rather, it should run through different stages of the course. From the perspective of the project's preliminary design, reform may be divided into four links: situational preparation, classroom implementation, post-class reflection, and continuous improvement. The key tasks in the early stage are to redesign the syllabus, reorganize case resources, and identify pilot classes. During implementation, emphasis is placed on organizing contextualized classes around specific topics. After class, experience is accumulated through student reflection and teacher review. Ultimately, a relatively stable course mechanism can be formed through continuous teaching. Because this study is based on the preliminary practice of a curriculum reform project, the focus here is on summarizing operational pathways rather than presenting exaggerated quantitative data.

First, situation design should adhere to three principles: authenticity, typicality, and openness. Authenticity does not mean that all cases must come from the teacher's own experience or from the university's affiliated hospitals; it means that cases should conform to the logic of medical practice so that students perceive them not as fictional games, but as conflicts that may occur in real professional settings. Typicality means that a case should focus on one or several core ethical issues rather than stacking too many details at once, otherwise students may become trapped in factual minutiae and neglect ethical analysis. Openness means that a case should not presuppose a single standard answer, but should instead allow students to make divergent judgments based on different ethical principles and role positions. For example, in a case where family members request that a terminally ill cancer patient be kept uninformed of the diagnosis, the classroom emphasis is not on forcing students to choose rapidly between disclosure and nondisclosure, but on guiding them to analyze the complex relationship among

patient autonomy, familial protection, cultural background, timing of communication, and physicians' duties.

Second, classroom organization should move from 'teachers explaining cases' to 'students entering cases.' In pilot design, each topic may include one primary case and one extension case. The primary case is used to complete the full chain of contextualized teaching, whereas the extension case is used for comparative discussion or transfer training. In a unit on informed consent and family surrogate decision-making, for instance, class may begin with a dialogue text among patient, family members, and physician, through which students initially identify the conflict; groups then assume different roles and discuss whether the patient should be informed directly, how protective requests from family members should be handled, and whether the physician should postpone disclosure; the teacher then introduces the tension among the principle of autonomy, the principle of beneficence, and local family ethics, synthesizing the students' views; finally, students may be asked to write a short response to the question: 'What ethical bottom line should a physician most firmly uphold while safeguarding the patient's interests?' This process combines experience with theoretical return.

Third, the course should deliberately incorporate frontier issues into contextualized teaching in order to strengthen the contemporaneity and relevance of Medical Ethics. The project proposal's suggestion to introduce AI medicine, digital health, palliative care, organ donation, and similar themes is therefore highly necessary. The reason is that the medical environment faced by contemporary students is no longer confined to the traditional doctor-patient relationship; increasingly, they are placed within structures shaped by algorithm-assisted decision making, data governance, platform management, and institutional allocation. If Medical Ethics continues to rely only on classic cases, both its attractiveness and its explanatory power in

relation to reality will be weakened. Taking the case of delayed treatment caused by a misjudgment in AI-assisted diagnosis as an example, a teacher may design a composite scenario involving a clinician relying on AI recommendations, a patient questioning machine judgment, and a hospital emphasizing efficiency indicators. Students can then discuss technological trust, responsibility attribution, informed explanation, and the boundary of professional judgment, thereby turning an abstract issue in technology ethics into a classroom situation open to analysis. Related research suggests that integrating medical humanities education into scenario simulation may produce more positive improvements in practical performance, overall achievement, and student satisfaction (Guo et al., 2025), which indirectly supports the necessity of integrating frontier scenarios with humanistic education.

Fourth, reflective writing and post-class follow-up are indispensable to contextualized teaching. One reason many curriculum reforms fail to produce stable effects is that classroom discussion ends as soon as class is over, while students' emotional fluctuations and value collisions in the situation are never systematically processed. On this basis, a brief reflective task may be set after each topic, such as: 'What was the most difficult point for me to decide?' 'Did I overlook the situation of a certain kind of subject?' 'If I enter clinical work in the future, how would I handle a similar conflict?' Such writing should not privilege literary style, but rather authenticity, specificity, and reasoned analysis. Teachers can then, through sampled feedback, peer sharing, or stage-based synthesis, help students identify blind spots in their judgments and trace their own developmental trajectory. In the long run, reflective texts themselves become important materials for improving the course.

5. From Classroom Participation to the Enhancement of Humanistic Competence

If knowledge transmission emphasizes what students have learned, value formation is more concerned with the ways in which students begin to understand others, their profession, and themselves. In the contextualized teaching of Medical Ethics, this change first becomes visible at the level of classroom behavior. Compared with traditional lecturing, students are more readily drawn into discussion once they enter concrete situations, because what they face is no longer an abstract concept but a practical problem with roles, language, and consequences. A common classroom phenomenon is that students who speak little during purely theoretical lectures become willing to articulate positions once role tasks are assigned. Differences among students no longer lie simply in whether they remember certain knowledge points, but in how they understand the priority of values, the boundary of action, and the mode of assuming responsibility. This indicates that contextualized teaching activates students' ethical subjectivity.

More importantly, the change appears in the way students understand patients and relationships. Traditional teaching often reduces ethical principles to a checklist of rules. Students may know that they ought to respect patients, support autonomous decision making, and protect privacy, yet they may not truly recognize the life experiences behind these principles. Patient narratives, role-playing, and scene-based discussion can reveal that a patient is not an abstract 'recipient of treatment,' but a person with fear, family, economic pressure, and cultural background; that family members are not merely those who 'obstruct disclosure,' but often persons under tremendous emotional strain; and that physicians' ethical dilemmas are not simply matters of what one ought or ought not to do, but are intertwined with time, institutions, resources, responsibility, and professional risk. Once students genuinely enter these situations in class, they are more likely to move from accepting principles to understanding relationships. This is one of the core aims of medical humanities education.

In addition, value formation is manifested in students' development of a more prudent mode of judgment. Contextualized teaching does not naturally lead students to unanimous answers; on the contrary, it often allows them to see ethical complexity more clearly. Precisely through this process, students gradually learn that judgment requires not only stating a position, but also explaining reasons; not only considering individual interests, but also taking institutions and consequences into account; not only adhering to bottom lines, but also understanding strategies of communication in actual practice. Such training helps cultivate a form of well-grounded prudence rather than simplistic, intuition-driven moral expression. Scenario-based role-playing and reflection can significantly promote students' deep understanding of professionalism because they shorten the distance between theory and practice and re-embed abstract ethics into contexts of action (Mianehsaz et al., 2023).

In the longer term, this kind of value formation in the classroom may also influence students' construction of professional identity. Medicine is not a purely technical profession; it requires practitioners to confront vulnerable life, limited resources, complex institutions, and high-pressure decision making on a continuing basis. If medical students come too early to understand their future profession as merely 'delivering the most effective treatment,' its humanistic dimension is easily compressed. Contextualized teaching in Medical Ethics can instead help students, even in the preclinical stage, recognize that becoming a physician means not only mastering knowledge and technique, but also learning how to respect persons, communicate with persons, understand persons, and take responsibility for judgment. In other words, contextualized teaching improves not merely classroom performance, but students' early understanding of what it means to be a trustworthy physician.

At the same time, contextualized teaching does not automatically produce value formation once adopted; in practice it still faces several challenges. Case use may easily become lively in form but weak in analysis. If teachers emphasize only classroom atmosphere without attending to problem-chain design and theoretical return, students may gain a sense of participation while remaining at the level of attitude expression and experiential judgment, rather than entering genuine ethical analysis. Accordingly, cases should not function merely as opening devices, but should be clearly linked to course concepts, normative frameworks, and assessment criteria. Teachers need to design analytical dimensions in advance for each case, including the principles involved, relevant stakeholders, focal controversies, and the relative persuasiveness of different lines of argument. Contextualized teaching also places higher demands on teachers. Compared with straightforward lecturing, teachers must be familiar not only with ethical theory, but also with case adaptation, classroom facilitation, disagreement management, and reflective assessment. Especially when student opinions differ sharply and discussion becomes emotional, teachers must preserve openness while preventing the class from losing focus. For younger instructors, such capacities are not naturally given; they need to be developed gradually through collective lesson planning, demonstration classes, variation in teaching the same course, and interdisciplinary collaboration. The project proposal's suggestion of relying on a mentor system and teaching-research salons to enhance implementation capacity is therefore highly necessary. Assessment tools and evidence accumulation also remain relatively weak. Many teaching-reform studies are quick to claim that students' humanistic competence has been significantly improved, yet without stable process records and valid evaluation tools such claims easily remain impressionistic. Subsequent reform should therefore further explore an evaluation-index system suited to Medical Ethics—for example, by establishing rubrics or scales around ethical

sensitivity, role understanding, argument quality, depth of reflection, and communicative performance, and by combining classroom observation, student assignments, and learning interviews into a more reliable chain of evidence. Only in this way can the achievements of curriculum reform rise from teaching experience to transferable educational research. Finally, contextualized teaching needs to be linked more closely with clinical settings. The value of an ethics course does not end in the classroom; it must ultimately return to clinical observation, clerkship experience, and professional practice. If classroom cases remain detached from real clinical life, students may come to regard ethical discussion as merely ‘moral exercise in class’ rather than rehearsal for future professional judgment. Where conditions allow, theoretical teaching should therefore be progressively connected with observational placements, hospital ethics rounds, narratives shared by clinical mentors, and patient-story activities so as to form a continuous experience from classroom to clinic.

Overall, the real difficulty in reforming contextualized teaching in Medical Ethics does not lie in whether one adopts a certain new method, but in whether one can establish a continuously operating course mechanism in which goals, content, methods, and assessment remain internally consistent. Only when classroom cases are constantly updated, teacher competence is continuously supported, evaluative evidence is gradually accumulated, and genuine connections with clinical practice are established will value formation cease to be a phrase in reform documents and become a stable fact in the cultivation of medical students.

6. Conclusion

The key to reforming the course Medical Ethics lies neither in adding more knowledge points nor in making the classroom appear more active on the surface, but in whether the course can genuinely change the way students understand medicine, patients, and professional

responsibility. Centered on the problem consciousness of moving from knowledge transmission to value formation, and drawing on the overall design and preliminary practice of the curriculum reform project, this article has argued for the appropriateness and necessity of contextualized teaching in Medical Ethics. Its fundamental value lies in returning ethical knowledge to real problems and enabling students, through role experience, value conflict, and reflective expression, gradually to form an internal understanding of medical humanities. In this way, Medical Ethics is no longer merely a theoretical course within the system of medical education, but can become an important educational link connecting knowledge, emotion, judgment, and action. In the future, as case resources, teacher support, and evaluation systems continue to improve, this reform pathway is expected to further expand both the depth and breadth of medical humanities education and to provide practical experience that may inform innovation in curriculum-based education under the background of New Medical Education.

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**Unveiling the Ecological and Naturalistic Views in Zhuangzi's
Daoism: Exploring the Concept of "The Usefulness of Uselessness"**

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Abstract

This study delves into Zhuangzi's philosophy to uncover the ecological and naturalistic views it presents. The focus is on understanding the concept of "The Usefulness of Uselessness" and its implications for environmental conservation and sustainable development. Through literature analysis and conceptual interpretation, the original texts of Zhuangzi are examined to explore his discussions on nature, ecology, and "The Usefulness of Uselessness." Their relevance to the ecological environment is revealed by comparing and analyzing these concepts. The findings suggest that Zhuangzi's philosophy aligns with contemporary ecological perspectives, emphasizing the inherent functions of all things in nature, even those that may appear useless. These seemingly useless elements play a vital role in maintaining ecological balance and ecosystem health. Zhuangzi advocates for humility, harmony with nature, and the responsible use of natural resources, promoting sustainable development of the ecological environment. The insights provided by Zhuangzi's philosophy can inspire modern environmental conservation and sustainable development practices. By appreciating the value of seemingly useless organisms and phenomena in the natural world and recognizing their significance to the ecosystem, people can adopt Zhuangzi's approach of "acting without action." This mindset fosters a humble and rational co-existence with nature, promoting harmonious and sustainable ecological development.

Keywords: Zhuangzi; ecological philosophy; The Usefulness of Uselessness;

view of nature; sustainable development

1. Introduction

Ecological protection is a pressing concern in modern society, necessitating the exploration of sustainable strategies. Zhuangzi's philosophy, an integral component of ancient Chinese philosophy, offers profound insights into ecological ethics, including concepts of harmonious co-existence with nature, respect for the equality of life, adherence to natural laws, and the unity of knowledge and action (Rahman, 2022; Wang, 2023). Given the escalating ecological crisis, it is crucial to draw inspiration from Zhuangzi's philosophy regarding ecological protection and examine its practical implications.

Both domestic and international scholars have extensively researched and discussed the ecological ethics found in Zhuangzi's philosophy. In China, Zhang Ke (2022) explored Heidegger's interpretation of the section "Observing Fish on the Háo" in the book *Zhuangzi* in the journal *Philosophical Research*, investigating the connection between the joy of fish and the fundamental nature of truth. Wang (2022) argues that Zhuangzi's emphasis on "uselessness" aims to advocate for a dialectical perspective on the relationship between utility and futility. In situations resembling Zhuangzi's predicament, where we face powerlessness against adversity, displaying our usefulness becomes futile and potentially detrimental. Instead, adopting Zhuangzi's approach of concealing our abilities and patiently waiting allows us to be

useful without actively seeking acknowledgment. Paradoxically, this practice of embracing “uselessness” actually yields greater effectiveness and utility. Embracing “uselessness” enables the realization of even greater utility, exemplifying the essence of the concept known as “The Usefulness of Uselessness.” According to Liu (2022), in examining the significance of “The Usefulness of Uselessness,” it is argued that Zhuangzi’s acceptance of his place in the world stems from his reverence for the natural order, leading to a profound emotional connection with life. This perspective resonates with certain elements of Confucian thought (Liu, 2022). In foreign scholarship, Mishra (2022) highlighted that Zhuangzi’s debates with Huizi or other individuals in this book are founded on his utilization of the perspectives of “is” or “is not”. Rošker (2023) performed an analysis centered on the notions of “self,” “transcendence,” and “truth” and reached the conclusion that Chinese thought diverges from Western thought in its interpretation of the concept of “self.” Rather than perceiving the self as a purely individual and autonomous entity, Chinese thought situates it within a specific domain.

In conclusion, the current research on the ecological ethics of Zhuangzi’s philosophy exhibits certain limitations. Firstly, the current research on the ecological ethics perspective of Zhuangzi’s philosophy is primarily confined to the theoretical realm, with a notable dearth of comprehensive investigations into its practical applications. Secondly, both domestic and international scholarly endeavors have yet to establish a cohesive research framework and methodological system. To rectify

these issues, it is imperative to enhance academic exchanges and foster collaborations, thereby facilitating the exploration and implementation of Zhuangzi's philosophy in the realm of ecological conservation. In light of these considerations, this study highlights the imperative of integrating Zhuangzi's ecological ethics perspective with modern science and technology while simultaneously emphasizing the exploration of practical applications. Moreover, it aims to establish a more comprehensive research framework and methodological system. By conducting thorough research and engaging in practical endeavors, this study aims to explore the significance of Zhuangzi's philosophy in ecological conservation. Through these efforts, it strives to make substantial contributions to promoting sustainable development and fostering the construction of an ecological civilization.

2. Ecological View in Zhuangzi's Daoist Philosophy

(1) An overview of Zhuangzi's philosophical thought

Zhuangzi (369 BC - 286 BC) stands as a prominent philosopher and writer from ancient China. His philosophical ideas align with the Daoist school of thought, and he is respectfully recognized as Zhuangzi (Espinoza, 2022). Zhuangzi's philosophy is intricately linked with his renowned work, "Zhuangzi," considered a significant Daoist classic (Liu, 2022). Central to his philosophy is the exploration of human existence and its intricate relationship with nature, emphasizing the pursuit of freedom, the transcendence of worldly constraints, and the importance of harmonious co-

existence with the natural world (Li, 2022). A concise summary of Zhuangzi's philosophical ideas is presented in Table 1 (Chung, 2023; Singh, 2023; Lai, 2022).

Table 1 Main content of Zhuangzi's philosophical thought

Zhuangzi's point of view	Interpretation and meaning	Application field	Related concepts
Pursue Dao	Zhuangzi's philosophical perspective posits that the Dao serves as the fundamental and governing principle of the universe, emphasizing the importance of humans attaining unity with the Dao.	Ecology, philosophy	Natural law, ecological wisdom, ecological ethics
Acting without action	Zhuangzi advocates for individuals to relinquish utilitarianism, desires, and artificial intervention and instead embrace a non-interfering attitude towards life, aligning themselves with the natural Wu Wei (non-interference or non-action).	Ecology, psychology	Ecological agriculture, natural restoration, low-carbon life
Equality and	All things in the universe are	Ecoethics,	Environmental

selflessness	regarded as equal and	sociology,	justice, ecological
	undifferentiated. Individuals	philosophy	equality, social
	are encouraged to transcend		equity
	the limitations of the self and		
	merge harmoniously with the		
	entirety of the universe.		
Reflection and	Zhuangzi employs fables to	Philosophy,	Ecological
illusionary	articulate humanity's	psychology,	reflection,
realm	contemplation of reality and	environmental	environmental
	critique of illusion.	education	awareness,
			sustainable
			lifestyle
Aesthetic	Zhuangzi's literary works	Aesthetics,	Ecological
appreciation	embody the quest for the	literature,	aesthetics,
and	a beauty of nature and the	environmental	environmental
liberated state	realm of life, emphasizing the	art	literature, natural
of mind	significance of aesthetic		art
	experiences and a liberated		
	state of mind.		

(2) Importance and significance of the ecological view of nature

The ecological view of nature encompasses recognizing and comprehending the interconnectedness and interdependence of the natural world, emphasizing the harmonious co-existence between humans and nature (Jumanov & Tolibjonovna, 2022). The importance and significance of adopting an ecological view of nature can

be summarized as outlined in Table 2 (Bakhronovna, 2022; Abduganiev & Makhkamov, 2022).

Table 2 Importance and significance of the ecological view of nature

Importance	Interpretation	Significance
Maintaining ecological balance	The ecological view of nature emphasizes the importance of ecosystem stability and health. Changes in organisms or environmental elements can have ripple effects on the entire ecosystem.	Recognizing and maintaining ecological balance is crucial for the long-term survival and well-being of both humans and the natural world.
Promoting sustainable development	The ecological view of nature highlights the interconnection between ecological environments and human society. It advocates for sustainable development that respects nature and ensures the responsible use of resources.	Promoting sustainable development based on the ecological view of nature is essential for preserving ecosystems, protecting biodiversity, and ensuring human well-being for present and future generations.
Enhancing ecological ethics	The ecological view of nature promotes respect and care for the natural world. It emphasizes human responsibility in	Embracing ecological ethics encourages sustainable behaviors, responsible decision-making, and the conservation of

	protecting and preserving the environment.	natural resources, safeguarding the integrity and stability of ecosystems.
Raising ecological awareness	The ecological view of nature fosters a deeper understanding and awareness of the environment. It raises concerns about environmental issues and inspires action.	Promoting ecological awareness is essential for inspiring positive change in behavior, encouraging environmentally friendly lifestyles, and addressing pressing environmental challenges.

(3) Zhuangzi's discussion on ecological nature

In the study of Zhuangzi's philosophy, the exploration of ecological and naturalistic perspectives revolves around his profound understanding of nature and his contemplation of the intricate relationship between humans and the natural world. This discourse encompasses various aspects, which are summarized as Table 3 (Ennen, 2022; D'Ambrosio, 2023).

Table 3 Zhuangzi's views on ecological philosophy

Zhuangzi's Views	Discourse
Natural Wu Wei	Learn from the natural state of Wu Wei, avoiding excessive intervention and alteration of nature's inherent state.
The Usefulness of	Emphasize the significance of seemingly useless organisms

Uselessness	and phenomena for the ecological system.
Natural self-sufficiency	Pursue natural self-sufficiency and freedom, renouncing excessive pursuit of material wealth and utilitarian behavior.
Harmony with nature	Adapt to the natural laws and rhythms, and coexist harmoniously with nature.

3. Connotation of Zhuangzi's "Uselessness of the Useful" Thought

(1) Analysis of the concept of "The Usefulness of Uselessness."

First, "The Uselessness of the Useful" is a prominent concept within Zhuangzi's philosophical framework. It serves to illustrate the existence of entities or actions that may initially seem devoid of utility but hold significant roles and functions in the natural realm. This concept finds extensive mention and elaboration in Zhuangzi's renowned work, *Zhuangzi: Free and Easy Wandering* (Ding & Yu, 2022). Zhuangzi further elucidates the notion of "Uselessness of the Useful" through the use of fables and metaphors. By drawing examples from the natural world, he elucidates the distinctive functions and roles played by organisms and phenomena within the intricate fabric of the natural system. Despite their outward appearance of insignificance, these entities are indispensable for the maintenance of ecological equilibrium and the proper functioning of ecosystems (Ko, 2019).

Second, the concept of "Uselessness of the Useful" embodies the idea of manifestation and withdrawal as an integrated thought. Zhuangzi put forward the notion of manifestation and withdrawal, stating that the world's manifestation and

withdrawal are interdependent and mutually reinforcing. Within this thought, the “Uselessness of the Useful” represents the aspect of withdrawal, where things or behaviors that may seem useless play essential roles in a state of withdrawal. Just like some overlooked organisms and phenomena in the natural world, they may not flaunt themselves but contribute and influence the entire ecosystem in their unique way. Through the concept of “Uselessness of the Useful,” Zhuangzi expresses the complementary nature of manifestation and withdrawal, reminding people to recognize and cherish those seemingly useless existences.

Third, the concept of “Uselessness of the Useful” within Zhuangzi’s natural philosophy entails the transformative potential of the seemingly useless. Zhuangzi’s perspective on nature underscores the significance of transformation, whereby things or behaviors that may appear devoid of utility can be imbued with usefulness. According to Zhuangzi, aligning oneself with the inherent laws and rhythms of nature is vital, fostering a harmonious co-existence with the natural world. Through profound comprehension and reverence for the diversity and distinctiveness of nature, individuals can effectuate the conversion of ostensibly futile elements into valuable contributions to the ecosystem. This transformative outlook holds profound implications for the sustainable development of ecology, guiding proactive engagement in environmental preservation and sustainable practices. By achieving a harmonious co-existence between humans and nature, this perspective paves the way for the preservation and flourishing of our shared environment.

(2) Multifaceted significance of Zhuangzi's "Uselessness of the Useful."

1) "Non-worldly and non-utilitarian use."

The concept of "Uselessness of the Useful" in Zhuangzi's philosophy challenges the prevailing emphasis on secularization and utilitarianism during his time. Zhuangzi lived in an era where both objects and individuals were predominantly valued for their practicality and utilitarian functions. Various social classes, including craftsmen and figures like Huizi and Nanbo Ziqi, viewed things from a utilitarian perspective, assessing their worth based on these criteria. In one instance, Zhuangzi, in the form of an oak tree, illustrated the potential risks faced by individuals like Ziqi, who were considered "materially useful." In contrast, he highlighted the peaceful existence and freedom attained by "ornamental trees" that served no practical purpose (Mickey, 2019). Zhuangzi's exploration of the "Uselessness of the Useful" challenges the narrow utilitarian viewpoint of his time, inviting a deeper reflection on the value and significance of things beyond their mere practical utility.

2) "Transcending perspectives and overcoming limitations of use."

The concept of "use" extends beyond narrow perspectives and limitations. It encompasses both utilitarian and humanistic viewpoints, converging to a broader perspective that reveals their inherent interconnectedness. In this broader context, seemingly "useless" entities can be understood as having latent value. Zhuangzi emphasizes the importance of considering the whole, enabling us to unlock the full potential of these seemingly unremarkable elements. Nothing in the world is truly

devoid of purpose; rather, it is our limited subjective consciousness that fails to recognize the value within. Evaluating something as “useful” should not be solely based on its practicality in human activities. Even the most seemingly insignificant entities possess inherent equality. Zhuangzi rejects confined and specific forms of utility, urging us to transcend narrow perspectives and seek a use that encompasses diverse viewpoints. From alternative angles, objects that may initially appear useless can acquire profound significance. It is crucial to refrain from assessing the usefulness or uselessness of individuals, objects, or life solely based on subjective intentions and biases. Only by doing so can we avoid perceiving fragments of reality and truly grasp their holistic richness (Wu, 2022).

3) Dialectical unity of usefulness and uselessness

The terms “useful” and “useless” are often juxtaposed to indicate the presence or absence of value or significance. Understanding the dialectical relationship between these concepts involves exploring two distinct levels. Firstly, at the subjective level, factors that fulfill individual human needs are considered “useful,” whereas those that fail to fulfill such needs are labeled as “useless.” This dichotomy reflects the intricate interplay between subjective human needs and objective necessities. This set of contradictions exhibits two key attributes: contradictory unity and contradictory opposition. “Useful” and “useless” represent two contrasting aspects that coexist, interact, permeate, and encompass each other. Notably, under certain circumstances, these two aspects can undergo a transformation, transitioning from one to the other. In

essence, “useful” and “useless” are mutually dependent, forming an interconnected dynamic (Khoirunnisaa & Widyastuti, 2022).

Furthermore, the demarcation between “useful” and “useless” is not absolute or fixed. On the one hand, usefulness and uselessness are indeed contradictory and mutually exclusive. In the realm of practicality, a useful path and a useless path stand in opposition to one another, constituting an unalterable contradiction. The notions of possession and absence are employed to ascertain the value of something. However, from another standpoint, these two contradictions also possess a mutually exclusive and opposing relationship. An interdependent and permeating connection exists within the realm of their co-existence. The transformation and transition between these opposing forces occur precisely due to their contradictory nature. Hence, usefulness and uselessness are complementary; without “uselessness,” there would be no “usefulness,” and uselessness serves as the foundation or prerequisite for usefulness. In addition, “useful” and “useless” rely on each other and remain unaffected by one’s perception of “uselessness”; without “uselessness,” there would be no “usefulness.” This concept can be metaphorically compared to a road that serves a purpose and a road that lacks purpose. As Zhuangzi aptly conveyed, both roads would be dug three feet deep, leaving only one road in the end. Nevertheless, this remaining road would lose its initial purpose. Therefore, whether in theory or in practical life, it is impossible to disentangle the interdependent relationship between “useful” and “useless.” The notions of possession and uselessness can permeate one

another and undergo transformation. As Zhuangzi expounded, a valuable path must be built upon a path without value, and a path without value can also be transformed into a valuable one. If a useful path does not receive adequate utilization, it will eventually lose its value (Hu, 2022).

(3) The Concept of “The Usefulness of Uselessness” and Zhuangzi’s ideological system

1) “The Usefulness of Uselessness” and Zhuangzi’s epistemology

The concept of “The Usefulness of Uselessness” in Zhuangzi’s philosophy is intricately linked to his epistemology, forming a harmonious and complementary relationship within his overarching philosophical system. Zhuangzi’s epistemology places emphasis on the interplay between subjective consciousness and the objective world, asserting that human comprehension is hindered by subjective biases and preconceived notions, thereby impeding a complete apprehension of the essence of objective phenomena. Zhuangzi argues against the excessive pursuit of utility and practicality, cautioning against an exclusive focus on superficial aspects while disregarding the intrinsic value inherent in all things. This predilection for utility and utilitarian thinking gives rise to deviations and misconceptions in our understanding of reality.

In contrast, the concept of “The Usefulness of Uselessness” serves as a reminder to transcend utilitarian perspectives and approach phenomena with an open and receptive mindset. Zhuangzi employs this concept to elucidate the distinctive

functions and roles that seemingly futile entities or actions play within the natural world, underscoring their value and significance within the broader ecological system. This notion aligns with Zhuangzi's epistemology, as it highlights how subjective biases and utilitarian viewpoints restrict our ability to grasp the true essence and inherent worth of things.

Ultimately, through the concept of "The Usefulness of Uselessness," Zhuangzi presents a realm that transcends utilitarian perspectives, encouraging a holistic approach that encompasses both the external manifestations and the internal nature and effects of phenomena. Zhuangzi contends that only by observing and understanding things with an open and detached mindset can individuals begin to approach the authentic essence of phenomena and attain genuine comprehension (Harte, 2022).

In conclusion, the concept of "The Usefulness of Uselessness" and Zhuangzi's epistemology harmoniously intertwine, supporting and reinforcing one another. "The Usefulness of Uselessness" serves as a reminder to transcend utilitarianism, urging individuals to adopt an open-minded approach to observing and comprehending the intrinsic nature of things. This cognitive attitude, which transcends utilitarian perspectives, aligns with Zhuangzi's epistemological stance on the interplay between subjective consciousness and the objective world. Collectively, these ideas form a crucial component of Zhuangzi's philosophical system.

2) "The Usefulness of Uselessness" and Zhuangzi's ideal realm

The concept of “The Usefulness of Uselessness” in conjunction with Zhuangzi’s ideal realm constitutes the exploration and portrayal of a philosophical domain within Zhuangzi’s philosophy. Firstly, Zhuangzi’s notion of “The Usefulness of Uselessness” underscores the need to transcend utilitarianism, recognizing and comprehending the profound value and intrinsic functions of seemingly useless phenomena. Zhuangzi contends that excessive emphasis on utility and practicality leads people to fixate solely on surface-level appearances, disregarding the essence and profound significance of things. The true ideal realm transcends utilitarian perspectives, inviting an open mindset to observe, understand, and grasp the essence of life and the universal Dao. Secondly, within Zhuangzi’s ideal realm, individuals surpass the confines of utilitarianism and pursue inner tranquility and freedom. They embody a transcendent state of mind, capable of transcending the fluctuations of joy, anger, sorrow, and pleasure and maintaining equanimity when faced with worldly matters. In this ideal realm, individuals can savor the beauty of existence and unravel the mysteries of the universe while harmoniously coexisting with nature. They relinquish the pursuit of external fame and gain, focusing instead on inner cultivation and spiritual elevation. They approach all matters with tolerance and equanimity, liberating themselves from the entanglements of utilitarianism and desires, thereby attaining inner peace and liberation. Lastly, the link between “The Usefulness of Uselessness” and Zhuangzi’s ideal realm lies in Zhuangzi’s conviction that through transcending utilitarian perspectives and adopting an open-minded approach to

comprehending the essence of things, individuals can gradually progress towards this ideal realm. Embracing the concept of “The Usefulness of Uselessness,” individuals transcend the limitations of utilitarianism, freeing themselves from the entanglement of superficial interests. Instead, they prioritize inner cultivation and spiritual elevation. Such a realm empowers individuals to transcend restlessness and turmoil, attaining a state of inner tranquility and equanimity. This state of being aligned with Zhuangzi’s pursuit of freedom, non-action, and desirelessness, ultimately led to the realization of his philosophical ideals (Kreis, 2023).

(4) The relationship between “The Usefulness of Uselessness” and ecological protection

The concept of “The Usefulness of Uselessness” has a significant relationship with ecological conservation, highlighting the critical functions and significance of seemingly useless elements within the ecosystem. The connection between “The Usefulness of Uselessness” and ecological conservation is presented in Table 4.

Table 4 The relationship between “The Usefulness of Uselessness” and ecological protection

Aspect	Relation
Shift in values	Remind people to transcend utilitarian perspectives, recognizing the unique roles and functions of all existences in nature, promoting respect and conservation of the ecological environment
Ecological balance and	Emphasize the important role of seemingly useless things or actions in maintaining ecological balance and stability, promoting

stability	the protection of the ecosystem
Complexity and	Remind people to adopt a holistic perspective towards ecosystems,
interconnectivity	protecting and maintaining the integrity and stability of the entire
of ecosystems	ecosystem, ensuring its normal functioning and sustainable
	development

4. Ecological Conservation Concepts in Zhuangzi's Philosophy

(1) Ecological balance and natural laws in the natural world

The ecological balance in the natural world encompasses a state of interdependence and constraint between life and the environment. Within natural ecosystems, the growth and reproduction of plants assume a vital role in the preservation of species diversity and the stability of the ecosystem. It is characterized by a spontaneously formed dynamic equilibrium, where diverse biological populations and environmental factors interact and mutually regulate one another. This interaction maintains a relatively stable population size and distribution within a specific area. Simultaneously, the ecological balance is sustained by the operation of natural laws, which embody universal principles governing the interactions and processes among organisms and environmental factors in the natural world (Wu, 2023; Deng et al., 2022). Figure 1 illustrates the relationship between ecological balance and natural laws in the natural world.

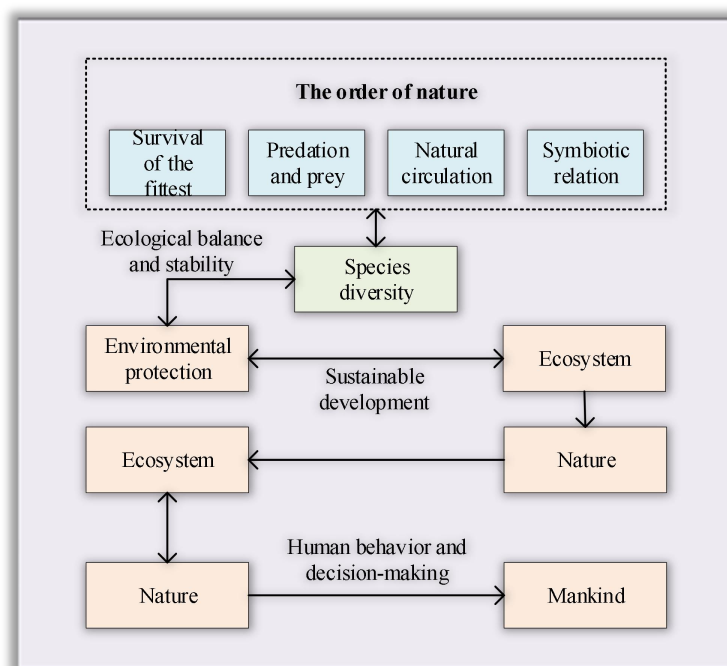


Figure 1: The Relationship between ecological balance and natural laws in the natural world

Figure 1 visually represents the intricate relationship between diverse natural laws and the maintenance of ecological balance in the natural world. The influences of different natural laws on ecological balance are further elucidated in Table 5, which highlights their respective roles and contributions.

Table 5 Effects of different natural laws on ecological balance in the natural world

Natural law		Effects and roles
Survival of the fittest	of	Organisms that adapt to the environment are more likely to survive and reproduce offspring.
		Organisms not well adapted to the environment face the risk of competition failure and extinction.

	Maintain the adaptability and diversity of biological populations, promoting species evolution and ecological adaptability.
	Maintain the balance and stability of ecosystems, preventing over-reproduction of a particular species that can lead to ecological imbalance.
Predator-prey relationship	Predators obtain energy and nutrients by preying on other organisms, maintaining the stability of food chains and food webs. Prey limits the growth of predators, controlling the relative stability of species populations. Balance the populations of organisms at different levels in the food chain, avoiding over-reproduction or extinction of a particular species, and maintaining ecological balance.
Natural cycles	Processes such as the water cycle, carbon cycle, and nitrogen cycle enable the recycling of matter in the biosphere. Maintain a balance between various components, ensuring stability in the material cycles within ecosystems. Provide nutrient supply and energy conversion, supporting biological growth and ecosystem functioning.
Symbiotic relationships	Interdependence between different species that promotes species diversity and ecosystem stability. Examples include pollination relationships between plants and bees and symbiotic relationships between trees and fungi. Provide opportunities for mutualistic symbiosis, increasing species adaptability and survival chances, maintaining diversity and stability

of ecosystems.

(2) The impact of “The Usefulness of Uselessness” on the ecosystem

Zhuangzi’s concept of “The Usefulness of Uselessness” has significant implications for the ecosystem, as depicted in Figure 2.

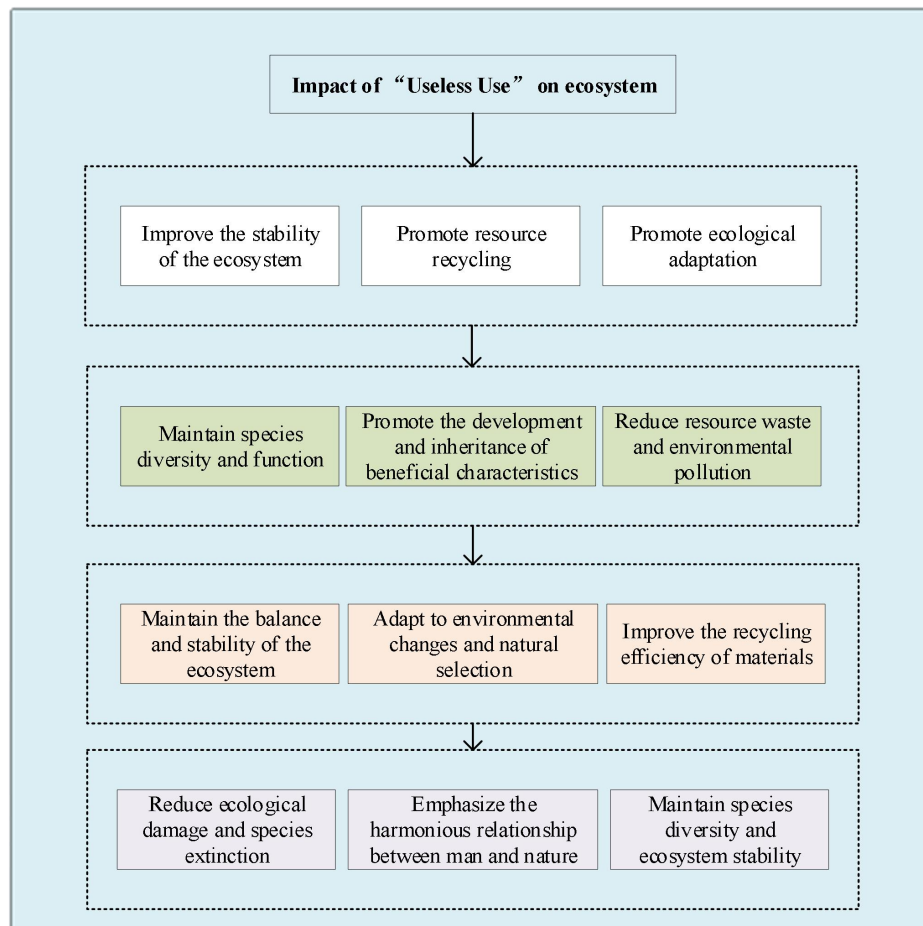


Figure 2: The impact of “The Usefulness of Uselessness” on ecosystems

Figure 2 illustrates the multi-level role of “The Usefulness of Uselessness” in the ecological environment. Firstly, “The Usefulness of Uselessness” significantly contributes to maintaining biodiversity, ecosystem functions, and overall stability. Secondly, the active utilization of seemingly useless elements promotes resource recycling, reducing resource waste and environmental pollution. Additionally,

harnessing the potential of “useless” components enhances resource reuse and adaptability to the environment, further bolstering ecosystem stability. Notably, while upholding biodiversity and ecosystem stability, the concept of “Useless” emphasizes the harmonious interaction between humanity and nature, leading to reduced consumption of biological resources. Collectively, these aspects support the ecosystem’s healthy and sustainable development.

(3) Ecological ethics viewpoint in Zhuangzi’s philosophy

Zhuangzi’s philosophy highlights the significance of harmonious co-existence between humans and nature, along with a deep sense of reverence and respect for the natural world. Figure 3 presents several key ecological ethics viewpoints within Zhuangzi’s philosophy.

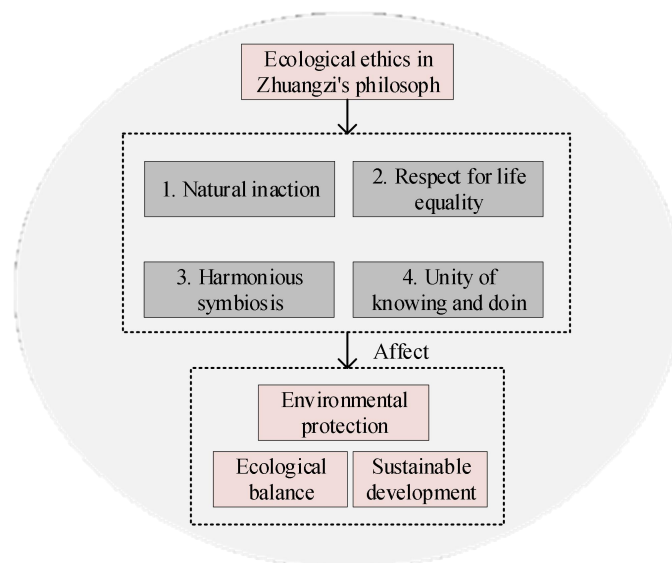


Figure 3: Display of ecological ethics in Zhuangzi’s philosophy

Building upon these principles, Zhuangzi’s ecological ethics framework focuses on environmental protection, promoting ecological balance, and striving for

sustainable development. He emphasized the importance of protecting and respecting all living beings to maintain ecological balance. Additionally, Zhuangzi emphasized the relationship between humans and their environment, as well as interpersonal relationships, highlighting the need to view objects not merely as objects but as interconnected entities. He advocated the “unity of knowledge and action,” promoting experiential communication with nature to gain insights into its wisdom and achieve harmony between humans and the natural world. Building upon these principles, Zhuangzi proposed an ecological ethics framework that prioritizes environmental protection, ecological balance, and sustainable development.

5. Enlightenment and Application of Zhuangzi’s Philosophy

(1) Challenges of modern ecological protection and sustainable development

Modern ecological protection and sustainable development encounter various challenges that necessitate attention and action. The principal challenges include the following key issues:

1) Climate change

Climate change stands as one of the paramount challenges of our era. The emission of greenhouse gases and widespread deforestation contribute to climatic warming, rising sea levels, and other consequential phenomena, profoundly affecting ecosystems and human society at large.

2) Biodiversity loss

The escalation of species extinction and the erosion of biodiversity represents another critical challenge. Human activities, such as habitat destruction, overfishing, and illegal wildlife trade, have inflicted severe harm upon species and ecosystems in the natural world.

3) Overexploitation of natural resources

The excessive utilization of natural resources by humans, including over-extraction of water resources, over-cultivation of land, over-fishing, and more, has resulted in resource depletion and ecosystem degradation. These practices pose significant challenges to the sustainable development of human societies.

4) Urbanization and land development

The process of urbanization, characterized by extensive land development, construction, and industrialization, significantly impacts the natural environment. The effects of urban expansion, industrial pollution, and land conversion present substantial challenges to the integrity and functionality of ecosystems.

5) Socioeconomic inequalities

Socioeconomic inequalities magnify the challenges of achieving sustainable development. Issues such as the unequal distribution of resources, poverty, and social exclusion contribute to heightened obstacles in the realms of ecological protection and sustainable development.

(2) The ecological significance of Zhuangzi's philosophy

Zhuangzi's philosophical ideas hold substantial relevance for ecological

conservation. Central to his philosophy is the concept of “harmony,” which focuses on the interconnectedness between “humans” and “nature” as well as between “objects” and “objects.” Zhuangzi advocates for “equality among all living beings” and places great emphasis on the preservation and reverence of diverse organisms in nature to uphold biodiversity and ecological equilibrium. Moreover, Zhuangzi’s notion of Wu Wei serves as a guiding principle for the development of the natural world, discouraging excessive manipulation or alteration of nature. In practical terms, he emphasizes the unity of “knowledge” and “action,” seeking to gain insight into the wisdom of nature through personal experiences and interactions with the natural world.

Furthermore, Zhuangzi’s philosophical ideas offer valuable guidance for fostering harmonious co-existence between human beings and nature, preserving biodiversity, and achieving sustainable development. In essence, Zhuangzi’s ecological thinking serves as a constant reminder to respect nature, seek harmony between humanity and the natural world, uphold the equality of all life forms, adhere to the laws governing nature’s evolution, and gain profound insights into the intricacies of nature through personal experiences and interactions. Such awareness of the interplay between humans and nature holds significant practical implications for protecting the natural environment, preserving ecological balance, and realizing sustainable development.

(3) Practical applications and promotion of Zhuangzi’s philosophy

The practical applications and dissemination of Zhuangzi's philosophy encompass a range of areas. Firstly, Zhuangzi's philosophical ideas serve as a crucial theoretical foundation for contemporary ecological conservation and sustainable development. Integrating Zhuangzi's ecological concepts with moral values can foster environmental protection, restoration, and sustainable economic and social development. Secondly, Zhuangzi's teachings hold enlightening significance for individual physical and mental development. By drawing inspiration from the path of self-cultivation and nurturing the mind depicted in the Zhuangzi, it becomes possible to alleviate stress, enhance the quality of life, and facilitate personal growth. Furthermore, Zhuangzi's philosophy, which places a strong emphasis on creativity, holds practical relevance in educational settings and entrepreneurial endeavors. Such applications serve to nurture creativity among students and practitioners while also contributing to societal progress and development. Lastly, Zhuangzi's advocacy for "intrinsic freedom" and "self-growth" is conducive to mental liberation, personal growth, and the improvement of individual happiness and life quality. By incorporating Zhuangzi's philosophy into real-life contexts, individuals can benefit from the wisdom and values it embodies, thereby promoting social harmony and overall development.

6 Conclusion

This study delves into the significance of Zhuangzi's philosophy in the realm of

ecological conservation. Through an examination of Zhuangzi's ecological ethics, the study reveals the profound implications and guiding principles that his philosophical ideas offer for contemporary ecological conservation. Zhuangzi emphasizes the importance of harmonious co-existence between humans and nature, reminding individuals to respect the natural world, protect ecosystems, and strive for balance and symbiosis between humanity and nature. The philosophy emphasizes equal respect for all life forms, emphasizing the need to protect and show reverence towards diverse organisms in the natural world, thereby preserving biodiversity and maintaining ecological balance. Zhuangzi's concept of Wu Wei guides individuals to align with the natural laws of development, discouraging excessive interference or alteration of biological systems while preserving the autonomy and spontaneity of nature. The philosophy also highlights the unity of knowledge and action, encouraging individuals to gain insights into the wisdom of nature through personal experiences and interactions with the natural world. Zhuangzi's philosophical ideas provide valuable perspectives for modern ecological conservation. However, it is vital to acknowledge the limitations of this study, which warrant further integration of contemporary science and technology to expand the application of Zhuangzi's philosophy. Moving forward, continued research and practical implementation of Zhuangzi's ecological, ethical viewpoints will facilitate their integration into contemporary ecological conservation practices and the exploration of scientifically sound and feasible strategies for ecological preservation. Through ongoing comprehensive research and

practical implementation, individuals can effectively draw upon Zhuangzi's philosophical ideas, making significant contributions to the protection and sustainable development of the ecological environment.

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