A Review of the Realistic Challenges of Brain-Computer Interface Technology on Ideological and Political Education

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Abstract: As the digitalisation strategy of education continues to advance, brain-computer interface (BCI) technology has been gradually applied to the field of education, injecting new vitality into the paradigm shift of ideological and political education, but at the same time, the potential risks have also been gradually exposed. On the one hand, the technology brings deconstructive challenges to the subject of ideological and political education, resulting in the blurring of the boundaries between the subject and the object; on the other hand, it creates subversive impacts on the content of ideological and political education, weakening its authority. In order to resolve the conflict between technology and education value rationality, this paper proposes synergistic coping strategies from the three dimensions of technology governance, education paradigm innovation, and system guarantee, aiming to promote the dialectical unity of technology instrumentality and education value, and to provide theoretical references and practical paths for the development of ideological and political education in the era of 'Digital Ideology and Politics'.

With the rapid development of science and technology, brain-computer interface technology, with its revolutionary breakthrough of 'mind control', has gradually penetrated into the field of education in the wave of accelerating education digitalisation strategy. Ideological and political education, as a key part of the education system, has ushered in the opportunity to realise paradigm transformation with the help of new technology, and also faces many challenges brought by the technology. It is of great significance to explore the impact of brain-computer interface technology on ideological and political education, and to explore ways to cope with it, in order to promote the innovative development of ideological and political education in the new era.

1 The deconstructive challenge of brain-computer interface technology to the main body of ideological and political education

Applying brain-computer interface technology to ideological and political education, it inevitably derives uncertainty between people and technology while playing an intelligent role. Compared to the cutting-edge development of educational technology, the subject and object of ideological and political education show relative independence in terms of role transformation, ideological acceptance mechanism and subject identity.

1.1 The dissolution of the boundaries between the subject and object of education

The intervention of brain-computer interface technology breaks the dichotomy between subject and object in traditional ideological and political education. In the dimension of the teacher, his role is alienated from 'knowledge authority' to 'neural interface designer', and the teacher-student relationship based on emotional resonance and linguistic dialogue in traditional education is replaced by neuroelectric stimulation and algorithmic procedures, leading to the educational process of 'dehumanisation' crisis. Taking the immersive Civics classroom as an example, teachers need to transform the teaching content into neural signals encoding, and the realisation of the teaching effect relies on the precision of the technological system rather than the inter-subjective emotional interaction. In the student dimension, the deprivation of cognitive autonomy by technology is even more significant. Brain-computer interfaces, by directly intervening in the prefrontal cortex, may bypass conscious censorship mechanisms and alienate the learning process into

conditioned reflexes of the neural reward system. Even if the principle of 'voluntary access' is followed, the competitive advantage of neural enhancement creates structural oppression, forcing students into the 'autonomy paradox' - the apparent technological empowerment actually exacerbates the passive dependence on the technological system.

1.2 Reconstruction of Ideological Acceptance Mechanisms

Brain-computer interfaces create 'instantaneous cognitive circuits' that have a disruptive effect on ideological acceptance mechanisms. Technology transmits information at millisecond speed, compressing learners' space for critical thinking and leading to the dissolution of "the piety of thought". The internalisation of political theories in traditional education requires semantic deconstruction, value analysis and subjective reflection, while the brain-computer interface environment simplifies the transmission of complex ideologies into a mechanical matching of neural signals, alienating learners from the main body of active construction of meaning to the passive reception of information terminals, threatening the value-led function of ideological and political education.

1.3 Neurotechnological Crisis of Subject Identity

Brain-computer interface technology reconfigures the basis for the construction of subject identity by establishing a direct neural connection between consciousness and equipment. Under the domination of the neural signal processing mechanism, the symbolic autonomy of language communication is replaced by the algorithmic logic of the technical system, and the subject of discourse is alienated from the dominant cognitive activity to the passive object of the technical intermediary, which triggers the weakening of the subject's status and the identity crisis. At the level of political identity, individual value judgement may be dominated by the rules of neural signal processing, making the formation of political identity deviate from the track of rational choice and shaking the essence of ideological and political education.

2 The subversive impact of brain-computer interface technology on the content of ideological and political education

In the field of ideological and political education, brain-computer interface technology has triggered a deep change in the education content system by constructing a direct interaction mode between the mind and the external environment. While creating new possibilities for cognitive interaction, this technological innovation has also systematically challenged the traditional educational paradigm in three dimensions: content authority, educational ethics and carrier form.

2.1 Technological deconstruction of content authority

The technological matrix composed of data, algorithms and computing power is reshaping the logic of discourse construction in ideological and political education. The 'algorithmic black box' mechanism embedded in brain-computer interface technology may pose a deconstructive risk to the authority of content, causing the generation and dissemination of educational discourse to be out of the subject's control, and leading to the dismemberment of the semantic integrity of political theory. On the one hand, the non-linear reconstruction of political theories by neural network decoders may fragment core concepts such as the 'community of human destiny' and dissolve their philosophical connotations; on the other hand, the implicit filtering mechanism of the technological system may lead to ideological bias and threaten the efficacy of the dissemination of mainstream values.

2.2 The need to reassess the ethical basis of education

The in-depth application of brain-computer interface technology is triggering a paradigm shift in the ethical foundation of ideological and political education. When the subject of discourse is alienated from a 'technology user' to a 'technology dependent person', the inherent tension between cognitive autonomy and technical rationality gradually emerges, forming an ethical dilemma. Long-term reliance on brain-computer interfaces for information acquisition makes individuals prone to fall into the double trap of 'technological coercion' and 'cognitive inertia'. The Kantian concept of 'self-discipline' faces a deconstructive crisis in the context of technological mediation, the cognitive process relies on the external processing of neural signals, the root of pure practical rationality has been hollowed out, the universality of

technology replaces the universality of rationality, and moral judgement has been reduced to the functional output of neural signals, which shakes the foundation of the philosophical ethics of education.

2.3 Paradigm Revolution of Content Carrier

Brain-computer interface technology promotes a fundamental change in the carrier of ideological and political education, showing two major transformation trends: first, the paradigm leap from linguistic symbols to neural signals, leading to the deconstruction of content stability. The semantic connotation of the same political terminology may generate 'morphological drift' due to differences in the receptor's neural state, making the standardised dissemination of educational content unsustainable. Second, technology-enabled ideological education realises value transmission through visual, auditory and even somatosensory neural multimodal stimulation. Abstract theories are transformed into neurological experiences, shifting ideological education from conceptual interpretation to embodied cognition, but individual differences in sensory experiences complicate the mechanism of value consensus formation.

3 Three-dimensional synergistic strategies to address challenges

The ethical impact of brain-computer interface technology on the discourse system of ideological and political education is essentially a manifestation of the conflict between technological modernity and the value rationality of ideological and political education. To build a systematic governance framework, it is necessary to form a synergistic response strategy from the three dimensions of technological governance, educational paradigm and institutional safeguard, so as to realise the dialectical unity of technological instrumentality and educational value.

3.1 Technology governance dimension: building a value-oriented technology regulation system

From the perspective of technological philosophy, it is necessary to establish a three-in-one technological governance mechanism of 'prevention-identification-guidance'. Through the development of neural algorithms dedicated to ideological security and the construction of a database of neural features of Marxist theory, automatic detection and blocking of erroneous trends can be achieved; at the same time, the principle of 'limited autonomy' of technological embedding should be clarified, and the final veto power of manual review should be retained, so as to ensure that the technology serves the value-orientation of education.

3.2 Innovation of Educational Paradigm: Reshaping the Parenting Mode under the Mediation of Technology

The change in the shape of education spawned by brain-computer interface technology calls for a breakthrough in the traditional 'transmission-acceptance' paradigm and the establishment of a 'prevention-identification-guidance' trinity of technological governance mechanisms. Developing special neural algorithms for ideological security and constructing a database of neural features of Marxist theories to achieve automatic detection and shielding of erroneous trends; at the same time, clarifying the principle of 'limited autonomy' of technological embedding, retaining the ultimate veto power of manual review, and ensuring that the technology serves the value orientation of education.

3.3 Institutional safeguard level: perfecting the educational governance framework in the age of technology

Technology application security relies on institutionalised constraints. In the subject dimension, establish a 'dual authorisation mechanism' for the use of neural data, with the subject's consent plus the relevant departments' records, full consideration of ethical risks, observance of data and privacy security, and the establishment of a regulatory mechanism and an information feedback channel, forming a "before - during - after" full-process process closed-loop technical supervision and accountability mechanism. In the content dimension, according to the Plan for Legislative Amendments on the Integration of Socialist Core Values into the Rule of Law, it is prohibited to use brain-computer interface technology for neural memory implantation of historical nihilism, extremism and other erroneous ideologies; establish a negative list of neural coding of educational content, and implement technological shielding of stimulation

modes that may trigger neurocognitive disorders.

The ethical impact of brain-computer interface technology on the discourse system of ideological and political education is, in essence, the manifestation of the conflict between technological modernity and the value rationality of ideological and political education. By building a synergistic response strategy in the three dimensions of technological governance, educational paradigm innovation, and institutional safeguard, the dialectical unity of technological instrumentality and educational value can be realised, providing theoretical support and practical paths for the development of ideological and political education in the era of 'Digital Thinking and Politics', and assisting ideological and political education to adhere to the mission of educating people in the technological wave, and realising innovative development. It will help ideological and political education to keep the mission of educating people and achieve innovative development in the wave of technology.

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