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Axiological, Institutional and Neuropedagogical Aspects of Holistic Education Development in the European Sociocultural Space

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Abstract: The article reviews the axiological and institutional foundations of holistic education development in the European sociocultural space. It synthesises pedagogical theory, the concept of empowerment pedagogy, and a critical analysis of educational neuroscience data. The research gap is substantiated by the lack of systematic research on the transformation of declarative European values (democracy, tolerance, and inclusion). The study focuses on how these values are transformed into stable cognitive-behavioural patterns at the level of the brain's frontolimbic system. The methodological boundaries of this conceptual synthesis are then clearly outlined. The study cautions against the direct projection of laboratory neurobiological data onto complex pedagogical practices. In addition, the article clarifies the conceptual and categorical apparatus, including "cognitive immunity", "restorative neurosociety", "algorithmic unity", and "empowerment pedagogy". Special emphasis is placed on the neuropedagogical dimension of incorporating European values into the educational space, with humanistic guidelines considered higher cognitive-affective metaprogrammes. The article suggests that the assimilation of liberal values functionally depends on the ability of the prefrontal cortex to suppress amygdala hyperactivity, which reduces the level of xenophobia and aggression. A model of a "restorative neurosociety" is proposed. It is conceptualised through institutional educational hubs and targeted cognitive-motor practices (bilateral stimulation and isochronous motor driving). These practices are considered hypothetical facilitators of the mechanisms of Hebbian plasticity and oxytocinergic modulation. Furthermore, the theoretical foundations of the "algorithmic unity" concept within Education 4.0 as a new stage of the Bologna Process are justified. The main limitations of the study are identified. These include the interdisciplinary complexity of verifying neuromarkers in the real educational process. Finally, the article outlines prospects for further research in the field of neuroethical regulation of artificial intelligence in higher education. This approach may support long-term potentiation (LTP) of neural ensembles associated with empathy, mirror neurones, and social affiliation. It may transform external sociocultural axioms into stable internal "cognitive immunity" and psychological resilience in modern youth.

Keywords: neuroscience; cognitive immunity; restorative neurosociety; values; axiological approach; education; Western Europe; humanism; human rights; empowerment pedagogy; tolerance.

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1. Introduction

Modern education is a social institution whose value system significantly influences the formation of both personal and social values. Axiological and institutional approaches provide a conceptual basis for the humanisation of education and support the transformation of general social ideals into one's subjective value hierarchy. At the same time, a detailed analysis of relevant scientific literature reveals a clear research gap: most studies are limited to descriptions of axiological norms (Wals & Benavot, 2017; Spychalski, 2023) or institutional reforms within the Bologna Process (Galtseva et al., 2020), neglecting the psychophysiological mechanisms underlying the internalisation of these values. The traditional declarative transmission of humanistic norms often demonstrates limited effectiveness under conditions of social turbulence if it is not based on the appropriate architecture of cognitive-affective processes.

This article is a conceptual (narrative) review aimed at a theoretical synthesis of interdisciplinary data from the fields of educational policy, axiology, empowerment pedagogy, and educational neuroscience. The study does not contain primary empirical data or quantitative statistical analysis but rather offers a theoretical framework for further empirical testing.

To address this gap, the article defines and elaborates on the following key concepts:

- “Cognitive immunity” – the ability of the brain, particularly the prefrontal cortex, to resist harmful information, manipulation, and stress by regulating affective impulses.
- “Restorative neurosociety” – an institutional educational environment designed to reduce anxiety and stimulate neuroplasticity through balanced cognitive-motor practices.
- “Algorithmic unity” – a proposed new phase of European educational integration within Education 4.0. It combines the unification of programmes with common ethical-algorithmic protocols for AI while preserving human subjectivity (human agency).

In the neuropedagogical context, stable value orientations function as higher cognitive metaprogrammes. Their stability is theoretically associated with synaptic consolidation and long-term potentiation (LTP) in frontolimbic circuits. The institutional design of the educational space should evolve from a passive knowledge-transmission system into a “restorative neurosociety”. Through bilateral stimulation and oxytocinergic modulation, such an environment may reduce amygdala responses associated with xenophobia, fear, and rigidity while strengthening prefrontal control.

In Western European countries, educational systems are undergoing reforms aimed at further integration, democratisation, and modernisation. Controversies remain regarding political, social, and economic decisions in education and the role of the national element in decision-making processes. However, Europe can be considered a specific axiological community based on shared basic values, principles, cultural patterns, and experience.

In this regard, it is essential to investigate the axiological, institutional, and neuropedagogical foundations of Western European educational systems. This would help identify the main values that educational processes in these countries seek to transmit and accumulate pedagogically valuable experience in implementing value-orientated education.

This article analyses not merely the presence of values but also their functional effectiveness under the influence of technological and neurobiological factors. It aims to conceptually substantiate the axiological and institutional foundations of holistic education development in the European sociocultural space. This is based on a synthesis of the neuropedagogical approach, empowerment pedagogy, and digitalisation models (Education 4.0).

2. Research Methodology

To ensure transparency and methodological clarity, this section outlines the strategy used for the selection, analysis, and synthesis of scientific literature.

2.1. Search Strategy and Databases

The search for scientific sources was conducted from September 2025 to January 2026 using Web of Science, Scopus, PubMed, ERIC, and Google Scholar. The search strategy was based on combinations of keywords using Boolean operators (AND, OR):

- (“European educational values” OR “educational axiology”) AND (“neuroeducation” OR “educational neuroscience” OR “frontolimbic”);
- (“Bologna Process” OR “Education 4.0”) AND (“empowerment pedagogy” OR “human agency”);
- (“cognitive immunity” OR “neuroplasticity in education”) AND (“inclusive education” OR “tolerance”).

2.2. Inclusion and Exclusion Criteria for Sources

The inclusion of materials in this conceptual review was based on the following criteria:

- Publication period: mainly works published from 2010 to 2026, with the exception of fundamental methodological works in axiology and neurobiology.
- Type of publication: peer-reviewed articles in scientific journals, monographs, and official analytical reports from international organisations (UNESCO, Council of Europe, OECD).
- Language: English and Ukrainian.
- Content relevance: works addressing value education, institutional educational reforms, or cognitive-neurobiological mechanisms of learning.

The exclusion criteria include the following: non-peer-reviewed publications, conference abstracts without a description of the methodology, articles from popular science blogs, and works on neuroscience without an application to or relevance for the educational context.

2.3. Selection and Analysis Procedures

A total of 240 publications were identified in the initial search. After screening the abstracts and removing duplicates, 85 full-text works were selected. Following a critical assessment of their scientific validity, the sources that formed the bibliographic basis of the article were included in the final synthesis. The collected data were subjected to qualitative thematic and comparative-conceptual analysis.

3. Theoretical Foundations

The key category in pedagogy is value. It is defined as the positive significance of environmental objects or ideas for society, a social group, or an individual. Values arise within the context of practical activities. Individuals not only recognise the properties of social and natural phenomena but also evaluate them in terms of their benefits or potential harm to their lives (Fischer & Bidell, 2006).

Within an individual’s life, values are the result of subjective assessment. They are closely related to motivational, behavioural, and emotional spheres. In this regard, axiology is viewed as the theory of values. It involves the formation of value orientations that determine the general direction of one’s interests and aspirations. They also shape the hierarchy of individual preferences and the motivational programme of their actions.

In practice, the formation of personal values is a complex and multifaceted process. Its outcomes can be predicted only with a certain degree of probability. In addition, one’s actions in

real life are influenced by their value concepts and various indirect factors. These factors can lead to significant discrepancies between the achieved results and the planned outcomes. Therefore, when forming one's personal values, it is necessary to consider the significant external factors that influence this process, including the environment, upbringing, and activities (Varela et al., 1991).

In light of the *Promoting Citizenship and the Common Values of Freedom, Tolerance and Non-Discrimination through Education* report (European Education and Culture Executive Agency, 2016), one of the tasks of sustainable development of societal sustainable development was identified as ensuring comprehensive and quality education for all. Fostering common core values in and through education should include the principles of democratic citizenship. Living in an ever-changing world means adapting to and assimilating to change (Lovat, 2011).

Active citizenship is based on democratic principles and assumes that citizens can actively shape and change society. Each generation should learn these principles and have the opportunity to apply them in practice. They include the rule of law, respect for human rights and freedoms, equality and non-discrimination, citizen participation in decision-making, responsibility, accountability of authorities, pluralism of opinions, and tolerance. Together, these principles form the basis for the sustainable development of a democratic society.

This approach is consistent with educational guidelines across European countries. According to these guidelines, education should develop an active citizen who is able to participate in democratic life, respect the dignity of others, and act according to the principles of social justice (Adams, 2008).

In this sense, education plays a leading role in promoting common values and developing engaged, critically thinking, and active citizens. The formation of these values in the educational systems of Western European countries is influenced by a number of factors. These include rapid global changes that require corresponding changes in education, growing ethnic and cultural diversity, the role of religion, increased attention to citizenship and democracy, and the orientation towards national ideas in each country.

Education also plays an important role in developing active citizens who can combine multicultural openness with the preservation of national identity. The formation of values takes place within the framework of intercultural education. This strategy is based on respect for cultural diversity, dialogue between cultures, equality and non-discrimination, as well as awareness of each nation's historical, linguistic, and cultural uniqueness.

This balance is achieved by incorporating national cultural heritage, language, and civic traditions into the curriculum. At the same time, these elements are combined with the teaching of European democratic values, human rights, and active citizenship. In this context, education serves not to unify but to integrate (Wals & Benavot, 2017; Makarova et al., 2025).

The basic values on which educational systems in Western Europe are focused include equality among all people as a fundamental European value, solidarity, and tolerance towards different social and cultural groups. They also include human rights, understood as natural rights protected by numerous legal and international norms. Another important value is humanism, which regards the individual as a self-improving being and an absolute value. It promotes the development of education and supports progress towards the achievement of one's goals. Freedom is also a fundamental value that regards the individual as free from the influence of social groups, state authorities, religious hierarchies, and other external forces (Müller, 2025).

The community of freedom and tolerance not only guarantees one's right to make decisions independently but also requires society to respect these decisions. These values include representation and the rule of law, democracy, non-discrimination, anti-racism, an inclusive society, interpersonal relationships, peace and international understanding, intercultural education, and environmental awareness (Andrieieva, 2018). At the same time, the formation of values such as freedom, non-discrimination, equality, and solidarity is particularly challenging due to the diversity of political, historical, religious, cultural, and social contexts across Western European countries.

With the creation and development of the European Union, educational systems have become increasingly interconnected. At the same time, national differences remain important. Each European country has its own historical and cultural background. Linguistic and cultural diversity is also an important principle of European educational policy. In this context, the Council of Europe promotes the preservation of linguistic and cultural diversity, while supporting shared democratic values and social cohesion (Council of Europe, 2022).

The political and social development of each country can influence its hierarchy of values. It can also shape the organisation and priorities of its educational system. For this reason, value education is closely connected with the social and political context of a country. Educational policies often reflect the values that are considered important by society and its institutions.

Teachers should be attentive to the demands that society places on the quality of educational services. They must also recognise their professional responsibility and their role in shaping the educational process. In fragmented postmodern societies, the coexistence of different ethnic groups and cultures does not necessarily entail the stigmatisation of cultural or ethnic differences. Rather, it can be supported by teachers who recognise and respect the national and cultural characteristics of their students. They should also identify opportunities to incorporate cultural diversity into classroom practices and group activities.

The formation of students' values can be supported through a comprehensive educational approach. Such an approach may involve different forms of value-orientated education. These include teaching subjects that explicitly address values and integrating related areas of knowledge. Interdisciplinary activities can further connect educational content with the wider community and students' social environment. Another important element is the development of a democratic culture within the educational institution. Inclusive education can further contribute to this process by bringing together students and teachers from diverse social, cultural, and ethnic backgrounds (Dehaene, 2021).

Values are also established and transmitted through students' everyday experiences and participation in social practices. Practical activities provide opportunities for students to experience, negotiate, and develop social values in meaningful contexts. Such experiences are closely connected with emotional and social processes that influence learning, engagement, and the construction of meaning (Immordino-Yang & Damasio, 2007). Students' participation in collective decision-making and forms of institutional governance can further contribute to the development and internalisation of shared values. These processes are shaped by adults who play an important role in establishing, transmitting, and maintaining the moral and social norms of the educational community. Such actors include parents, teachers, and religious leaders.

The modernisation of European education is a comprehensive process that affects all its levels and types. Contemporary society requires an educational system that is both effective and flexible. It must also respond to the priorities of the international educational space.

The renewal of vocational education is closely connected with changes in the economy and society. It is influenced by developments in science, engineering, technology, and regional labour markets. As a result, educational systems need to respond not only to current labour-market demands but also to future employment trends. This involves continuous monitoring of labour-market needs for specialists with different qualifications.

The Bologna Process has contributed significantly to the transformation of European higher education. It can be considered in the context of three major global trends. The first is the growing internationalisation of education and academic mobility. Digital technologies allow large amounts of information to be transmitted across national borders. However, knowledge is also exchanged through the mobility of students, teachers, academic programmes, standards, and teaching practices. In this sense, academic mobility has become an important mechanism for the international circulation of knowledge.

The second trend is the development of the knowledge economy. Knowledge has become an increasingly important factor in economic development and competitiveness. Countries therefore

need to invest in education, research, innovation, and human capital. Furthermore, they should internationalise their intellectual resources and labour markets. The Bologna Process contributes to this development by promoting cooperation and creating opportunities for the exchange of knowledge and expertise across European countries.

The third trend is linked to changes in established patterns of power and influence in today's world. Traditional sources of state power, such as territory, natural resources, and armed forces, are commonly associated with "hard power". These forms of power are increasingly complemented by "soft power", which includes a competitive economy, effective governance, active diplomacy, moral authority, an attractive international image, and the quality of a nation's human potential. The pooling of European resources in the field of higher education reflects the growing importance of "soft power" instruments (Müller, 2025).

The Bologna Process is increasingly regarded as a form of "soft power". It contributes to Europe's attractiveness and competitiveness at the global level and provides opportunities for the effective use of one of its most valuable resources: human potential.

The Bologna Declaration identified six main objectives aimed at promoting greater coherence within European higher education (European Ministers of Education, 1999). These included the introduction of easily understandable and comparable qualifications, the adoption of a multi-level higher education system, and the use of a credit system to measure students' workload. The Declaration also provided for the inclusion of information on study programmes in diploma supplements, based on a model developed by UNESCO.

The transition to a multi-level higher education system also facilitates the mobility of students, teachers, and administrative and managerial staff. It contributes to the quality of higher education and supports the mutual recognition of qualifications. At the same time, it promotes greater institutional autonomy within higher education.

The creation of a common European Higher Education Area therefore requires qualifications to be transparent and comparable. This was identified in the Bologna Declaration as a fundamental step towards greater cooperation in European higher education. Comparable qualifications facilitate academic mobility and simplify recognition procedures. They also facilitate the development of common approaches to quality assurance. These measures are important for adapting European higher education to labour-market requirements and strengthening its competitiveness and attractiveness (Galtseva et al., 2020).

The introduction of multi-level higher professional education (bachelor's, master's, and doctoral levels) is an important element of comprehensive higher education reform. Nowadays, when technologies and knowledge are developing rapidly, it is no longer reasonable to train "narrowly specialised" specialists within higher education institutions from the first year of study for a period of five to six years.

The adoption of a broad-based bachelor's programme, followed by further specialisation at the master's level or in professional practice, is more consistent with the rapidly changing labour market. Such a flexible system provides a basis for developing a structure of qualifications and curricula that meets the needs of society.

The main idea of multi-level professional education is to distinguish between general and professional education. Multi-level higher education allows students, during the first years of study in a broad-based programme, to make a more informed choice of specialisation. This specialisation can then be developed in the later semesters of the bachelor's programme. A student first receives a broad general education in one of the currently recognised fields, such as natural sciences, humanities, social and economic sciences, or technical sciences. They then acquire a profession and specialisation at different levels (Dubaseniuk, 2018).

After completing the first level, the holder of a higher professional education diploma has the opportunity to reconsider their life plans in response to possible changes in the labour market. They may decide to continue their studies at the master's level. Alternatively, they may take advantage of a wide range of professional development programmes leading to a qualification.

The multi-level system creates favourable conditions for the interaction of continuous, periodic, and systematic education. It also provides broad opportunities for a flexible approach to the development of state educational standards in relevant fields and specialities. On this basis, educational and professional programmes and curricula can be developed. These provide the necessary freedom to implement new ideas of openness and variability in the organisation of educational content and the educational process.

This approach takes into account a number of factors. These include regional characteristics, national and cultural characteristics, the level of students' pre-university preparation, the creative capabilities of teachers, staffing, and the educational and material resources of higher education institutions (Zhelanov, 2021).

Understanding the goals and objectives of education in the 21st century highlights the need to strengthen the subject-orientated aspect of traditional education for children, young people, and adults. This function is performed by institutions of additional education. They currently form a multi-level and holistic education system capable of ensuring interaction between students and teachers engaged in intellectual and creative activities.

The content and organisation of learning in institutions of additional education for adults are being renewed in response to teaching staff's recognition of the value of prior learning experience. It is also related to the growing diversity of educational needs among adults with higher-education backgrounds who engage in lifelong learning.

In this context, the principles of empowerment pedagogy become particularly relevant. They provide for the active participation of learners in determining learning goals. They also support the development of autonomy and self-reflection, responsibility for their educational pathway, and the use of life and professional experience as a key learning resource.

A notable European example of implementing these principles is the phenomenon of Universities of the Third Age. These institutions are widespread in European countries. They focus on social inclusion, active longevity, intergenerational interaction, and the personal development of people of mature age.

Within the concept of adult education and lifelong learning, researchers identify such determining factors as professional intention among older adults and the organisational effectiveness of the University of the Third Age. These factors may affect motivation and learning effectiveness (Rebrova & Rebrova, 2024).

In the foreign scientific tradition, empowerment pedagogy is considered an essential basis for the pedagogy of sustainable development. It is aimed at enhancing individual capabilities, social responsibility, and active citizenship.

New areas of vocational education are emerging through creative exploration. New forms of cooperation with schools and scientific institutions, public organisations, and the wider environment have also developed. However, these developments have not yet been sufficiently analysed and systematised.

This situation raises questions about cooperation and the integration of educational resources across several educational institutions at regional and international levels. It also highlights the need to create educational networks (Galtseva et al., 2020).

In the context of professional development, networking among educational institutions is a form of joint activity. It allows students to complete an educational programme of a certain level and focus using the resources of several educational institutions. This involves not only combining educational resources due to their current shortage in many schools but also promoting cooperation between general secondary, additional, and vocational education at different levels. The latter is largely related to the new function of upper secondary school as a stage of pre-professional and pre-university preparation for school graduates. This strengthens continuity between school and higher education and supports the use of teaching formats and methods typical of higher education in the senior grades (Hinton et al., 2012).

The development of a professional development system is becoming increasingly important in modern society. Such a system allows the rapid addressing of problems related to the development of individual competence.

Today, there are grounds for discussing the emergence of a new information culture. This culture can become an element of the broader culture of humanity. Its basis can be knowledge of the information environment and the laws governing its functioning. It also includes the ability to navigate information flows. With the capabilities of information and communication technologies (ICT), the modern educational system is acquiring new and divergent forms of development.

Divergent thinking within professional training refers to the ability to generate a variety of ideas or possible solutions and is closely associated with creative potential. It is generally characterised by fluency, originality, and flexibility, which involve producing multiple ideas, and approaching a problem from different perspectives (Runco & Acar, 2012). It is important to consider how information and communication technologies can support creative activity within professional development (Sterling, 2010).

1. The use of ICT can promote close cooperation between teachers and students. The creative process and its results can be presented and discussed at an online conference. They can also be published in an electronic publication or posted on the website of an educational institution.

2. ICT can expand the capabilities of the educational environment. This can be achieved through various types of software and methods that promote students' creativity. Such programmes include modelling programmes, search programmes, intelligent training programmes, expert systems, and business modelling programmes. Electronic textbooks also place considerable emphasis on the development of creative thinking. They contain heuristic and creative tasks for this purpose. They may also include questions that do not have an unambiguous answer. Communication technologies make it possible to implement methods that promote creative activity in new ways.

3. The new content of the educational environment can create additional opportunities to stimulate curiosity, including among adults. One such opportunity is provided by the global Internet. It gives users access to electronic libraries, interactive databases of cultural, scientific, and information centres, encyclopaedias, and dictionaries. Students can use the Internet to ask questions about topics of interest. They can address these questions not only to their mentors but also to leading national and international specialists. Questions can also be discussed at electronic conferences or in chats. The variety of information available in the educational environment and integrated into the global information space helps teachers encourage students to form their views on the problems being studied. Students' curiosity and interest in research activities can also be supported through work in virtual scientific laboratories. In addition, students can conduct computer experiments using simulation programs.

4. Personal webpages of teachers can provide additional opportunities for students to access their creative work. Such webpages can be created on the websites of educational institutions. They can contain educational materials, teachers' scientific publications, descriptions of current research projects, and examples of students' best work. A similar approach can be applied to creative cognitive activity. Modern technologies can contribute to the development of relevant skills. They can also make many stages of the creative process more effective and help achieve better results. This is particularly relevant to scientific research and innovation (Varela et al., 1991).

An important prerequisite for developing an ICT-based system of vocational training is the creation of a unified educational information network. Such a network should bring together educational institutions of different types. It would create opportunities for the dissemination of educational resources and innovative methods. It would also support the implementation of joint educational projects and the development of a unified system for accessing educational resources and programmes within the region.

It is reasonable to assume that a crucial aspect of educational reform is a change in the content of training. This involves reorganising the educational process and moving from repetitive

learning towards active learning activities. Such changes can create the necessary conditions for identifying and developing the creative individuality of future specialists.

The transformation should concern not only the diploma but also the content of education. This content should be brought into line with existing international standards. At the same time, such changes should be implemented carefully. They should not involve the thoughtless destruction of the foundations and integrity of the existing national education system. Nor should they deny or ignore the positive experience that has already been accumulated. On the contrary, this experience should be taken into account and used as fully as possible.

4. Neuroscientific Approaches to the Axiological and Institutional Development of Holistic Education in the European Socio-Cultural Space

The development of holistic education in the European sociocultural space is increasingly considered from the perspective of neuroscientific research. This perspective may provide a deeper understanding of value formation, motivation, social behaviour, and one's capacity for continuous development. Neuroscientific research can also contribute to understanding the relationship between the axiological principles of education and the institutional forms through which they are implemented. This relationship is important for the development of a holistic and humanistically orientated educational system.

From the perspective of neuroscience, values are not exclusively cognitive constructs. Rather, they may be shaped through the interaction of cognitive, emotional, and social neural networks. Liberal values that underpin European education, including human rights, freedom, tolerance, solidarity, and democracy, may become integrated into the personality when they are emotionally experienced, socially reinforced, and practically applied. In turn, the learning experience is supported by emotional and motivational mechanisms associated with the activity of the limbic system (Tsymbal-Slatvinska et al., 2022).

The principle of neuroplasticity forms an important neuroscientific basis for holistic education. Special emphasis is placed on the institutional focus of European education on lifelong learning, multi-level education, academic mobility, and flexible educational pathways. Accordingly, education is viewed as the continuous development of a holistic personality who can adapt to rapid social changes.

Neuroscientific research also highlights the importance of social interaction in the internalisation of institutional norms. In particular, social learning may engage mirror neurones and social cognition networks. In turn, these processes may promote democratic principles, academic integrity, responsibility, and cooperation. Additionally, European educational institutions are increasingly implementing partnership-based models of interaction (Berbets et al., 2021).

Inclusive and intercultural education are also important components of the European educational space. They can be considered from a neuroscientific perspective. Interaction with representatives of different social and cultural groups may contribute to the development of empathy and cognitive flexibility. It may also reduce intergroup prejudice. Such educational practices may involve neural mechanisms associated with social understanding. They can therefore support the ability to coexist peacefully in a pluralistic society.

In modern European education, particular attention is given to the digitalisation of the learning environment. From a neuroscientific perspective, digital learning may support the development of metacognitive processes, self-regulation, and divergent thinking. However, it is crucial to use such technologies appropriately to provide broader access to educational resources without compromising the axiological principles of personalised learning.

Theoretical justification of Table 1

A comparative analysis of two conceptual paradigms is proposed to systematise the evolution of current educational systems. The first is the Traditional Bologna Model, which emphasises institutional harmonisation and structural standardisation. The second is the

“Algorithmic Unity” model, which integrates neuroethical principles, artificial intelligence, and cognitive interaction into educational processes.

The comparison is based on three interconnected dimensions: neuroscientific mechanisms, axiological dimensions, and their institutional manifestations in education. This framework is intended to illustrate the transformation of educational systems. The transformation extends beyond structural and administrative convergence.

Particular attention is given to the neuroscientific mechanisms associated with development of values and social interaction. These mechanisms may also contribute to the formation of institutional norms and individual subjectivity.

Table 1 summarises the main neuroscientific pathways involved in the formation of the axiological and institutional dimensions of holistic education.

Table 1. Neuroscientific pathways for developing the axiological and institutional dimensions of holistic education

Neuroscientific mechanism	Axiological dimension	Institutional manifestation in education
Emotional and motivational processes (limbic system)	Formation of humanistic and democratic values	Dialogic learning, an empathetic educational environment
Neuroplasticity	Orientation towards development and self-improvement	Lifelong learning, multilevel education
Integration of cognitive and emotional networks	Holistic worldview, responsible choice	Competence-based and interdisciplinary approaches
Social learning, mirror neurones	Solidarity, cooperation, tolerance	Democratic culture of the educational institution
Social-neural mechanisms of inclusion	Non-discrimination, respect for diversity	Inclusive and intercultural education
Metacognitive processes	Autonomy, self-reflection	Digital and networked educational environments

Source: The authors' own conception

5. Critical Discourse: Limitations and Controversies in Educational Neuroscience

The application of neuroscientific findings to educational theory and practice remains the subject of considerable debate in the scientific community (Howard-Jones, 2014). One major methodological concern is the risk of “neuropropaganda” and the development of neuromyths. Examples include claims about “left-brain/right-brain learning” and “learning styles”. Such claims may result from the oversimplification of complex neurobiological phenomena and their direct application to classroom practice.

Most neurobiological studies, including research on the functions of the amygdala and the prefrontal cortex, are conducted in controlled laboratory settings. These studies commonly use methods such as functional magnetic resonance imaging (fMRI) and electroencephalography (EEG). They are also often conducted with specific, relatively small samples. Laboratory conditions differ considerably from those of real-world educational environments. Therefore, claims that a particular pedagogical method directly “restructures synapses” or “reduces amygdala activity” should be interpreted with caution. In this review, such claims are considered theoretical hypotheses and conceptual interpretations rather than established empirical facts.

Thus, the neuroscientific approach makes it possible to view holistic education in the European sociocultural space as a process involving the coordinated development of values and the institutional mechanisms for their implementation. The integration of neuroscientific knowledge into pedagogical theory and educational practice can contribute to the development of a personality

guided by values, social responsibility, and autonomy. Such a personality is capable of active participation in democratic society.

6. Conclusions

The importance of the article lies in the study of axiological and institutional aspects of holistic education in the European sociocultural space. It emphasises the importance of developing values among the younger generation. Particular attention is paid to their motivational, behavioural, and emotional spheres. These aspects may also influence the development of society as a whole.

The article suggests that European countries rely on liberal values and human rights. These values form an important axiological basis for the education system and European society. In this context, current educational models may benefit from the integration of a neuropedagogical approach. This approach makes it possible to examine the assimilation of sociocultural values through the functional architectonics of the brain.

From the perspective of the neurocentric paradigm, tolerance, solidarity, and empathy are associated with complex neurodynamic processes. These processes may involve the prefrontal cortex (PFC) and the mirror neurone system. Traditional institutional models often focus on declarative (explicit) learning. Under conditions of chronic distress, this can contribute to cognitive overload and emotional exhaustion among young people.

At the same time, neuropedagogical modelling involves the creation of a holistic ecosystem of educational hubs. Such environments may help modulate excessive amygdala activity through the targeted activation of the central executive network and the parasympathetic nervous system. This may reduce stress-related patterns, xenophobic attitudes, and cognitive rigidity.

Thus, neuroscientific approaches can help transform external axiological imperatives into stable internal cognitive-affective metaprogrammes. This may support the formation of a holistic personality with a high level of cognitive immunity and resilience. The main values guiding the educational systems of Western European countries are also identified.

The article further suggests that the modernisation of the European education system is an institutional response to the axiological challenges of contemporary society. This process has developed particularly within the framework of the Bologna Process. It includes multi-level education, academic mobility, lifelong learning, and digital educational environments.

The transition to new forms of organising education and professional training may have created conditions for the development of a holistic personality. Such a personality is capable of self-development, creative activity, and responsible participation in social life.

Finally, the article identifies the main neuroscientific approaches to the formation of the axiological and institutional foundations of holistic education in the European sociocultural space.

Statement on the Use of Artificial Intelligence

The authors confirm that artificial intelligence tools, including ChatGPT (OpenAI), were used to explore ideas and improve the readability and language of the manuscript. Online searches were also conducted using search engines enhanced with large language models (LLMs). The final interpretation of the results, formulation of conclusions, and scientific generalisations remain solely the responsibility of the authors.

Scientific Contribution

The article proposes a conceptual shift from a formal and structural understanding of the Bologna Process towards the paradigm of “algorithmic unity”. This perspective emphasises the transparency of AI algorithms, neuroethics, and the preservation of human agency in European educational integration. The study also proposes a neuropedagogical approach to axiogenesis. It considers value formation as a process involving cognitive, emotional, and social mechanisms of learning. This approach highlights the role of emotional processing and cognitive control in the development of value-based behaviour.

A further contribution is the proposed institutional model of a “restorative neurosociety”. It proposes combining empowerment pedagogy with cognitive and motor practices in educational hubs.

Research Limitations

The main limitation of the article is its predominantly conceptual and theoretical nature. Empirical verification of the proposed neuropedagogical markers in real-world higher education settings requires further research. In particular, the assessment of long-term potentiation and amygdala activity would require specialised laboratory equipment, such as fMRI and EEG. The complexity and cost of such methods make their large-scale application in educational settings difficult.

Implications and Directions for Future Research

The conceptual findings provide a basis for developing interdisciplinary educational programmes in neuroethics and practical guidelines for countering information manipulation through the development of cognitive immunity. They can also develop the establishment of regulatory standards for the safe and ethical use of artificial intelligence in higher education institutions.

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