

Constructing the Paradigm of English Major Talents Based on Digital Education: A Perspective from Three-Dimensional Model of Educational Ecology

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Abstract—Digital technology serves as a catalyst for reshaping the paradigm of talent cultivation. The educational ecology framework and its Three-Dimensional Model offers insights into developing talent cultivation paradigms for English majors in digital education. This approach emphasizes the intricate interplay and co-evolution of ecological factors within the educational ecosystem, adopting a holistic view of interactions and the principles of systemic balance. By considering the dynamic relationships among ecological environment, individual ecology, synecology, and system ecology, eventually fostering a harmonious educational setting, encouraging personalized development for English majors, establishing a learning community, and implementing a comprehensive evaluation system, thus promoting the well-rounded growth of English major students.

Keywords—paradigm, English major talents, three-dimensional model, educational ecology

I. INTRODUCTION

With the swift progress of digital technology, higher education is seeing transformative changes. Digitalization has reshaped teaching and learning and significantly influenced educational objectives, content, and methods. In this light, English major education must rethink its talent development paradigm. This research explores fostering the growth of English majors through the lens of educational ecology's "people-education-environment" model within the digital education setting.

Digitalization in higher education is a critical issue, with the highlighting three main areas: teaching, curriculum, and infrastructure [1]. The aim is to boost the learning environment, efficiency, research capacity, and innovation. However, challenges such as cultural adaptation, technological innovation, policy guidance, and system development [2], complicate this transition. Some scholars further study identified specific hurdles like teacher training gaps, inadequate infrastructure, and

difficulties with internet and digital platform usage [3]. Some also noted that digital technology can boost the efficacy of English instruction and assessment [4]. And the multimodal teaching approaches can foster inclusive pedagogy, diversify information delivery, and support foreign language teaching culture, enhancing students' social adaptability and personal growth [5]. Utilizing Halliday's functional grammar to craft an online ESP curriculum, which aligns with the educational demands of the digital era [6]. Digitalization is revolutionizing English education by enhancing effectiveness and inclusivity, yet it presents challenges that must be addressed. Constructing a robust paradigm for English major talents is essential to overcoming these obstacles.

Educational ecology presents a comprehensive framework for examining the intricate relationships among humans, education, and the environment. Some Chinese scholars articulate an "ecosystem" as the complex interplay between living organisms and their environment [7, 8], delving into the interdependent mechanisms among the ecological environment, individual ecology, synecology, and system ecology to address educational issues [9]. Educational ecology aims to foster a robust and sustainable educational environment. It requires an in-depth grasp of the interplay and reciprocal effects among all elements of the educational ecosystem.

Within the framework of cultivating a harmonious educational ecosystem, the pivotal role of English major students draws the utmost attention. It is imperative to delve into how they can achieve balanced development within this system to promote their comprehensive growth. This paper, from an ecological viewpoint and using the "people-education-environment" model, analyzes the relationships and influences within the educational ecosystem. It looks at how different parts of the system work together, aims to lower the costs of education, and seeks the best way to cultivate English talents in universities.

The Connotations, Characteristics, and Development of Educational Ecology

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Educational ecology is a multifaceted concept that refers to the interaction and balance between educational entities and their surroundings. It is the interplay between educational subjects and their environment, stressing that education emerges from the interconnectedness of these subjects and environmental factors [10]. The goal of educational ecology is to support education's healthy and harmonious development. Others detailed the composition, structure, function, and evolution of educational ecology, highlighting its complex traits such as openness, dynamic balance, holistic connectivity, non-linearity, order within chaos, synergism, autonomy, and self-adaptability. These features capture the intricate nature of the educational ecosystem [11]. Among them, Systemicity in educational ecology refers to the diversity of ecological subjects, environments, structures, functions, and the various forms of dynamic change within the system. These factors, both macro and micro, create a dynamically balanced educational ecosystem. Linkage within educational ecology is shown through the essential interdependencies and checks and balances among its internal and external factors, where any disruption can impact the system's coordination and development. Understanding the concepts, characteristics, implications, and development of educational ecology has enhanced our comprehension of educational progress in the modern era. It underscores the significance of advancing educational equity and quality within the educational ecosystem.

In digital education, finding a smooth development paradigm for English majors requires looking at how people, education, and the environment interact. This involves considering students, teachers, and others; activities like teaching and learning; and the environment, including physical, social, and tech aspects. Using this model helps us see how these parts of the educational ecosystem connect and affect each other, which can help cut costs and find better ways to train English majors in colleges. This should help English studies grow in a balanced way.

II. THE "PEOPLE-EDUCATION-ENVIRONMENT" THREE-DIMENSIONAL MODEL IN THE EDUCATIONAL ECOSYSTEM

A. *The Brief Introduction of the "People-Education-Environment" Model*

The "People-Education-Environment" model is a comprehensive educational framework that integrates the roles of individuals, educational processes, and environmental factors within the educational ecosystem. Inspired by Descartes' three-dimensional space model, which uses mathematical principles to define space with X, Y, and Z axes, this ecological model adapts that concept to education. It establishes a more nuanced and dynamic structural relationship and operational mechanism among people, education, and environment within the educational ecosystem. By doing so, it uncovers the underlying patterns that govern the interactions among different elements within this system.

1) *The dimension of "People"*

In the educational ecosystem, the "People" dimension represents the individuals at the heart of the system. Their growth relies on education and the environment. This includes both individuals and groups, shown by the X-axis to represent development from left to right. Unlike other ecological subjects, in educational ecology, the focus is on teachers and students, who drive educational activities. The educational ecosystem aims for the sustainable development of "people" as its core and end goal. To achieve better growth, individuals within this system are always looking for the best roles to play, the optimal ecological niche, which helps the educational ecosystem develop in a balanced way.

2) *The dimension of "Education"*

The "Education" refers primarily to school education, which encompasses a series of education-related activities conducted by teachers and students. Through education, students and teachers undergo socialization, with a sequential relationship existing between the two in the socialization process. This ecological factor of school education includes multiple sub-ecological factors, such as educational goals, management systems, and teaching content. Represented by the Y-axis, it indicates an upward and downward developmental trend. Education is completed through a series of activities and is one of the important environments for human growth and development. School education is a composite structural system constituted by "people-activities-environment".

3) *The dimension of "Environment"*

The "Environment" dimension refers to the multi-dimensional ecological environment surrounding the "people" and "education" within the educational ecosystem. This encompasses the natural environment, which provides the material basis for human survival; the social environment, which includes two levels: the broader socio-political, economic, and cultural context in which people and education exist, and the sub-ecological factors such as family, learning conditions, and community organizations that directly affect people and education; and the value environment, which represents the attitudes, concepts, and values that "people" hold towards their social and natural environments. The environment is represented by the Z-axis, indicating a front-to-back developmental trend. The environment serves as a prerequisite condition and safeguard for people and education to carry out a series of activities.

III. THE HARMONIOUS RELATIONSHIP AMONG "PEOPLE-EDUCATION-ENVIRONMENT"

People, education, and environment are essential components of the educational ecosystem, and their dynamic balance is crucial for the harmonious development of the educational ecology. The term "harmony" mentioned here refers to a category of relationships, where relationships and harmony coexist. Harmony is not just any relationship; it is an ideal and good relationship, characterized by a stable, orderly, and coordinated state [12]. The harmonious development of "people-education-environment" refers to an ideal "good" relationship among the three, where the educational

ecosystem interacts with the larger external environment through the flow of materials, information, and energy in the form of “input-output” or “immigration-emigration” fluctuations. This dynamic succession, efficient operation, and stable and coordinated development state are essential for achieving ecological balance in student development within the education system. To realize this, it is necessary to clarify the dialectical relationships among people and education, people and environment, and education and environment within the perspective of educational ecology.

A. The Dialectical Unity of People and Education

From a materialist perspective, humans are the primary subjects within the educational ecosystem, while education exists as an objective entity external to humans, facilitating a “symbiotic relationship” between the subjects and objects within the educational ecosystem. This symbiotic relationship is instrumental in fostering the harmonious development of people and education. As social beings under societal conditions, the primary goal of education and environment should be to actualize the educational subject’s leading role in teaching, to leverage human proactivity, to explore human diversity, individual potential, and value. This approach assists the subject in developing the concept of autonomous and lifelong learning, thereby promoting personalized student development.

B. The Dialectical Unity of People and Environment

The environment in this context primarily refers to the profound social environment that influences people, including school, family, and community environments, as well as other surrounding environments. The “Broken Windows Theory” suggests that the environment has a suggestive and inducing effect on people, who in turn can change their surroundings based on variable conditions. It is a reciprocal process where “people create the environment, and the environment also creates people”, with both selecting and shaping each other. Within the educational ecosystem, a cyclical pattern of “balance-imbalance” and “new balance-new imbalance” often emerges, reflecting the co-evolution and joint influence of people and their environment. People are the products of the synergistic evolution of education and environment. Under favorable and ideal conditions, people exert a positive feedback effect on the development of education and environment, complementing each other and ultimately achieving common development.

C. The Dialectical Unity of Education and Environment

The development of individuals is contingent upon the interplay between education and environment. In examining the relationship between education and environment, two representative perspectives have emerged: “educational determinism” and “environmental determinism”. Both positions commit an error of extremity by exaggerating their respective roles while undermining the influence of the other. Education shares a degree of similarity with the social environment, often referred to as the macro environment, with education

being dubbed the micro environment. To a certain extent, education is a microcosm of the social environment, and the two maintain a relationship of mutual constraint and promotion. Education can selectively transform and create the social environment, and a superior social environment can fully leverage students’ proactivity, potential, and creativity. The ultimate goal of educational talent cultivation is to serve society, and the demands of the social environment dictate the education’s cultivation of talent. Both education and human development are subject to the impact of the social environment.

D. The Dialectical Unity of People, Education, and Environment

The development of individuals is intricately linked to the interplay between education and environment. Historically, two dominant perspectives have emerged in the discourse on the relationship between education and environment: “educational determinism” and “environmental determinism”. Both positions are characterized by an extremity that overemphasizes their respective roles while undermining the influence of the other. Education shares a degree of similarity with the social environment, with the social environment often referred to as the macro environment and education as the micro environment. To a certain extent, education is a microcosm of the social environment, and there exists a relationship of mutual constraint and promotion between the two. Education can selectively transform and create the social environment, and a superior social environment can fully leverage students’ proactivity, potential, and creativity. The ultimate goal of educational talent cultivation is to serve society, and the demands of the social environment dictate the education’s cultivation of talent. Both education and human development are subject to the influence of the social environment.

IV. CONSTRUCTING THE PARADIGM OF ENGLISH MAJOR TALENTS BASED ON DIGITAL EDUCATION: A PERSPECTIVE FROM THREE-DIMENSIONAL MODEL OF EDUCATIONAL ECOLOGY

This part explores students’ development in the context of educational ecology, offering a broader view on fostering a comprehensive vision. It discusses four strategies for enhancing college students’ harmonious growth within an educational ecosystem. The paper examines the ecological environment, individual ecology, Synecology, and System ecology to reveal the intricate interactions and balance vital for student development and sustainable educational progress in the digital age.

A. Ecological Environment: Constructing a Harmonious Educational Ecological Environment

Digital technology is reshaping the educational landscape by creating dynamic and interactive classroom environments. Utilizing tools like interactive whiteboards, learning management systems, and AI-powered educational software, teachers can foster a more engaging learning experience. These technologies can provide personalized learning paths, real-time feedback, and

collaborative opportunities that cater to individual student needs. For example, AI can analyze student performance data to recommend tailored learning strategies, enhancing self-efficacy and critical thinking skills.

The extracurricular and practical ecological environments are also being transformed by digital innovation. Virtual Reality (VR) and Augmented Reality (AR) offer immersive experiences that complement traditional classroom learning, allowing students to engage with complex concepts in a safe and controlled virtual setting. Additionally, digital platforms facilitate extracurricular activities by providing online courses, professional certifications, and digital badge systems that recognize achievements outside the classroom, thus promoting a well-rounded educational experience.

The construction of digital learning resource libraries is a key component of the educational ecosystem. These libraries, powered by AI and new media technologies, offer a vast array of educational materials that are accessible anytime and anywhere. AI curation of content based on student interests and learning styles creates a personalized learning resource library that supports diverse learning needs. Teachers play a pivotal role in guiding students through these digital environments, requiring them to possess digital literacy skills to effectively integrate technology into their teaching practices.

In conclusion, the integration of digital technology into the educational ecological environment not only enhances the learning experience for English major students but also equips them with the digital skills necessary for the modern workforce. It is through this harmonious blend of technology and pedagogy that a sustainable and innovative educational ecosystem can be achieved.

B. Individual Ecology: Enhancing Personalized Development in English Majors

Individual ecology in the context of English major education emphasizes the dynamic interplay between students and their educational environment, which is increasingly influenced by digital technology. This integration aims to enhance personalized development by leveraging technological advancements to create more interactive, adaptive, and responsive learning experiences.

The first aspect of integrating digital technology into individual ecology is the transformation of teaching philosophies and practices. With the advent of big data, AI, and 5G technologies, educational strategies are evolving to include data-driven insights and personalized learning paths. For instance, AI can be used to analyze student performance, allowing for the creation of tailored educational content that addresses individual strengths and weaknesses. This approach not only enhances academic achievement but also fosters critical thinking and self-efficacy among students.

The second aspect involves the use of digital tools to facilitate strong teacher-student relationships. Digital platforms can enable more egalitarian and respectful dialogues, fostering a deep connection between educators and learners. Teachers can act as facilitators, providing

clear objectives and guidance both in and out of the classroom, and using digital tools to enrich lessons with moral education and cultural elements. This integration of digital technology into teaching practices helps to create a more engaging and meaningful learning experience.

The third aspect is the innovation in pedagogical approaches, where information technology is used to collect student data, design educational processes, and implement micro-lesson teaching. Cloud platforms can be used for intelligent tracking and tutoring, providing insightful feedback that allows students to understand their learning trajectories. This technology-driven approach overcomes temporal and spatial constraints, promoting self-directed learning and creating a supportive environment for personalized development.

In summary, the integration of digital technology into the individual ecology of English major education is pivotal for enhancing personalized development. It does so by evolving teaching philosophies, refining teaching conditions and models, and innovating pedagogical approaches that support innovation, practical application, diversity, and vitality. Teachers play a crucial role in this process, guiding students through the digital landscape and facilitating their holistic growth.

C. Synecology: Creating an Ecological Learning Community for English Majors

Synecology, which examines the relationships between populations or communities and their environment, is aptly applied to the educational context through the concept of an ecological learning community. This community, comprising students and teachers, thrives on digital platforms that facilitate communication, collaboration, and sharing, thereby enhancing deep learning and co-evolution among its members.

The establishment of such communities is heavily reliant on educational intelligent tools. Modern platforms like QQ, WeChat, Rain Classroom, blogs, cloud platforms, Tencent Video, Enterprise WeChat, and Questionnaire Star serve as the digital foundation for creating both student and teacher-student groups. These tools not only connect individuals but also support the sharing of resources and ideas, fostering a collaborative environment that is essential for an ecological learning community.

Moreover, the construction of an ecological learning community is significantly enhanced by the competence and relational soft skills of teachers. Teachers' knowledge systems, thinking systems, and ecological environment construction abilities are crucial. These hard skills are complemented by relational soft skills such as leadership, organization, motivation, management, presentation, and affability, which are necessary for guiding the community and nurturing a productive learning dynamic.

In the realm of digital technology, the role of teachers extends beyond the traditional classroom. They must be adept at leveraging information technology to collect student data, design educational processes, implement micro-lesson teaching, and use cloud platforms for intelligent tracking and tutoring. These technologies overcome temporal and spatial constraints, promoting self-directed learning and providing insightful feedback

that allows students to fully understand their learning trajectories.

The ecological classroom, at the heart of constructing an ecological learning community, focuses on educational innovation in philosophy, content, and methods. It aims to create a vibrant, charming, and profound classroom experience that embodies the principle of teaching through beauty, achieving the effect of “moistening things silently”. This approach is essential in building an ecological college student learning community, where digital technology plays a pivotal role in facilitating knowledge transfer, e-learning, and engaging students in a globalized and interconnected world.

D. System Ecology: Establishing an Ecological Teaching Evaluation Mechanism

System ecology, when applied to higher education, views the educational ecosystem as an integrated whole that includes populations, communities, and ecosystems. It emphasizes the interdependence and interaction between these elements and their environment. In the context of higher education, establishing an ecological and systematic evaluation mechanism for college students is essential for maintaining the balance and health of the educational ecosystem. The misuse of ecological niches in teaching evaluation can lead to imbalances, highlighting the need for a dynamic, holistic, and systematic evaluation system that accounts for functionality, subject differences, and various methods.

Digital technology plays a pivotal role in this ecosystem by enhancing the evaluation mechanisms. Functional evaluation, which includes diagnostic, formative, and summative assessments, can be streamlined through digital platforms that track student progress and outcomes in real-time. These platforms can integrate data from various sources to provide a comprehensive view of student learning processes and outcomes, thus enabling a dynamic evaluation.

Subject-specific evaluations can also be expanded through digital means, allowing for a broader range of evaluators, including students, parents, experts, and enterprises. This approach extends teaching evaluation beyond the classroom to include extracurricular activities, providing a more holistic analysis that includes internal and external evaluations.

Moreover, digital technology enables both qualitative and quantitative evaluations, depending on the methods used. Quantitative research can focus on the objectivity and precision of evaluation, while qualitative evaluation can delve deeper into the characteristics of the evaluation object. The combination of these two approaches, facilitated by digital tools, can offer a more comprehensive evaluation of students.

The ecological evaluation mechanism, enhanced by digital technology, should promote the comprehensive and long-term development of both teachers and students. It should evaluate not only students' knowledge and abilities but also their moral, methodological, emotional, attitudinal, and value perspectives. This forms a positive evaluation effect and contributes to the construction of a

more systematic and comprehensive evaluation mechanism.

In summary, digital technology is integral to the establishment of an ecological and systematic evaluation mechanism in higher education. It enhances the functionality, subject differentiation, and methodological diversity of evaluations, ultimately fostering a balanced educational ecosystem that supports the holistic development of students.

V. CONCLUSION

Inspired by the digitalization of higher education and ecological theory, the author constructs a “People-Education-Environment” three-dimensional model based on “Educational Ecology Theory”, revealing the deep operational laws and the dynamic balance among individuals, educational processes, and environmental factors to foster a robust educational ecosystem. The sustainable development of English majors could be enhanced by four strategic pathways: constructing a supportive ecological environment, promoting personalized development through individual ecology, creating collaborative learning communities via synecology, and establishing a comprehensive evaluation mechanism in system ecology. These pathways address the interplay between teaching, curriculum, infrastructure, and the broader social context, aiming to cultivate well-rounded English talents equipped for the digital era. The research on the integration of digital technology in higher education and its impact on English major education, while may have several limitations, the research could benefit from a more in-depth exploration of the long-term impact of digitalization on student outcomes, including not just academic achievement but also skills such as critical thinking, problem-solving, and digital literacy that are essential in the modern workforce. Additionally, while the study emphasizes the importance of a harmonious educational ecosystem, it may not sufficiently consider the role of external factors such as policy guidance, cultural adaptation, and system development in shaping the integration of digital technology in education. Lastly, the research could also delve deeper into the ethical and societal considerations of digital technology use in education so as to further the study on this topic.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

Hongmei Li was responsible for the initial conceptualization and drafting of the manuscript, who also integrated the feedback received from Geyi Cheng into the final version of the manuscript; Yige Cheng provided critical feedback on the manuscript at various stages of its development and assisted with the revision process; both authors have read and approved the final manuscript.

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