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Development Path of Innovation and Entrepreneurship Education in Universities Under the Digital Economy

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Abstract: With the development of digital technology and new models of digital economy, innovation and entrepreneurship education in colleges and universities is facing a new development situation. New methods such as online courses, digital platforms, and value co-creation have brought new opportunities and challenges to the content, mode, and mechanism of innovation and entrepreneurship education. This paper discusses the content and new opportunities of digital entrepreneurship, analyzes the differences between traditional entrepreneurship and digital entrepreneurship, and puts forward the strategy path of entrepreneurship education under the digital economy.

Keywords: Digital economy; Entrepreneurship education; Development path

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1. Introduction

In 2014, with the slogan “mass entrepreneurship and innovation,” colleges and universities set off an education process to popularize innovation and entrepreneurship. With the development of the digital economy, after entering the era of Industry 4.0, the digital economy will affect production, life, social development, and national economic strength, and artificial intelligence, big data, and algorithmic computing power will become the focus of future research. The digital economy breaks down industry barriers, accelerates information transmission, and integrates various resources on digital platforms. It also fully participates in the whole process of production with big data information, enhances collaboration between industries, and empowers industries and participants to produce a multiplier effect. These give full play to new development mechanisms such as technological innovation, industrial co-creation, and value linkage of the digital economy, and change the form, content, and structure of innovation and entrepreneurship education in colleges and universities.

2. Literature review

Zaheer *et al.* proposed that digital entrepreneurship is a typical interdisciplinary study [1]. Hull *et al.* proposed that digital entrepreneurship is a process in which the application of digital technology changes traditional entrepreneurship in terms of value creation, opportunity identification, and resource utilization [2]. Nambisan proposed that digital technology affects digital product development, digital marketing process, digital communication mode, and digital workplace, and digital technology participates in part or all of the entrepreneurial process [3]. William Cohen, founder of the incubator, defined digital entrepreneurship as a social, economic, and technological phenomenon that uses digital technology to change traditional innovation and business models in the digital era. Kraus *et al.* believed that digital entrepreneurship is more flexible and it emphasizes the role of disruptive innovation, such as the digitization of resource acquisition by entrepreneurial subjects, the digitization of source of entrepreneurial opportunity selection, and the digitization of enterprise operation and management process. Yu *et al.* believed that the digitization of the selection process of entrepreneurial projects in digital entrepreneurship is an innovation and entrepreneurship realized through the continuous interaction between society, organizations, and individuals, and digital components, digital technologies, and digital platforms [4]. Based on domestic and foreign researches, Li proposed that digital entrepreneurship is an entrepreneurial activity that realizes asset digitization, marketing digitization, product digitization, and service digitization based on cloud computing, big data, artificial intelligence, and other technologies. Liu *et al.* proposed that digital technology changes traditional enterprises, including industrial digitalization and digital industrialization, emphasizing that digital technology enables innovative products, entrepreneurial elements, organizational processes, business models, and other fields. They compared the differences between digital entrepreneurship and traditional entrepreneurship in entrepreneurial elements, entrepreneurial teams, entrepreneurial opportunities, entrepreneurial resources, entrepreneurial process, and theoretical basis, and pointed out that digital innovation is a destructive innovation process [5]. Zhu *et al.* expounded the characteristics and elements of digital entrepreneurship. It emphasizes the embodiment of digital technology, digital entrepreneurial ability, digital entrepreneurial opportunities, digital entrepreneurial resources, digital business models, and other contents in digital entrepreneurship [6].

Digital entrepreneurship refers to the use of the Internet, social media, digital platforms, artificial intelligence, and other digital technologies for entrepreneurial activities. This kind of entrepreneurship can be divided into two forms. One form is entrepreneurship based on digital technology innovation, such as technological innovation and entrepreneurship through 5G mobile network technology and component innovation, smart wearable device invention, etc. The other category is entrepreneurship using existing digital technology applications, such as empowering industries with digital technology traditions, new media, and using big data to create new business models and discover new business opportunities.

Ma *et al.* put forward that the current university creative education idea and mode require continuous innovation to adapt to the rapid change of the economic society. Digital capabilities include digital entrepreneurial perception ability (self-worth, situational awareness), digital entrepreneurial cognition ability (digital entrepreneurial awareness, digital strategic thinking, digital technology proficiency), digital entrepreneurial execution ability (digital innovation ability, digital operation ability, resource management ability, cooperation and communication ability, risk response ability) [7]. Huang *et al.* pointed out that entrepreneurship schools in universities relying on entrepreneurship education are faced with problems such as weak infrastructure, insufficient teaching ability of teachers, poor project market transformation, and slow construction of digital platforms, and proposed that practical teaching, characteristic teaching, and interdisciplinary teaching should be emphasized, and the digital practice platform should be improved, thereby

building a digital entrepreneurial ecosystem [8]. Wang proposed that the meta-universe has the characteristics of situational, interactive, immersive, and experiential. Based on "common presence," "virtual identity," "digital twin," and "co-creation," the teaching mode and cognitive psychology are changed, the learning situation of college students is enriched, the personality experience of teaching is opened, and the diversified and comprehensive evaluation based on data is realized [9]. Lei *et al.* proposed to improve digital entrepreneurship education by integrating design thinking into the curriculum system of university digital entrepreneurship education based on the perspective of design thinking [10].

3. Traditional entrepreneurship is different from digital entrepreneurship

3.1. "Innovation core" under the requirements of digital technology

Digital technology has the characteristics of high information density, rapid growth and sharing, and providing open, flexible, convergent, and generative capabilities to promote new organizational forms and new business models. Digital entrepreneurs obtain user needs through big data resources, and provide precise products and services to match user needs. Garbuio *et al.* found through case studies that it is easier for entrepreneurs to identify the value proposition of different target users with the help of artificial intelligence (AI) technology, thus opening-up new business models [11]. Zahra proposed that it is easier for digital entrepreneurship to achieve the transformation of digital technology results. Digital technology has changed the way of obtaining traditional business resources. Big data and intelligent push mechanism help digital entrepreneurs to more easily obtain resources that are difficult to obtain in traditional entrepreneurship, especially start-up capital and human resources. Enterprise digital transformation has an important impact on innovation efficiency, supply chain innovation, resource allocation, management innovation, and so on. The United Nations argues that digital technologies are advancing faster than any innovation in our history and can play a well-balanced role by enhancing connectivity, financial inclusion, access to trade, and public services. Taking American entrepreneurial universities as an example, the proportion of universities, government, and industry in the status of innovation and entrepreneurship is increasing, and colleges and universities have become an important part of the national innovation system, key laboratories, and technology research centers, and the ratio of university patents and high-tech achievements transformation is constantly improving. The advanced artificial intelligence of generative artificial intelligence such as ChatGPT will disrupt numerous industries. The research and continuous application of China's iFlytek in multidimensional expression, deep understanding, and sports intelligence have brought new breakthroughs in intelligent communication, virtual human, and artificial intelligence.

3.2. Organization construction of multi-team dynamic collaboration

Digital organizations constantly break the boundaries of organizations showing flat and dynamic characteristics, and build multi-team collaboration, cross-field, interdisciplinary, cross-regional, and dynamic cooperation. On the basis of "user-centered," we use digital and online service mode to improve user service level. Enterprise digital transformation is not only the iteration and upgrading of digital technology, but also the realization of multi-platform, multi-level, and multi-network relationship upgrading of stakeholders with a shared open network platform as the carrier, which is a process that can flexibly gather and disband different teams according to needs [12]. In terms of team formation and function, Jia *et al.* proposed that the members of digital entrepreneurship team should be open (based on digital network), which solves the differences of time, space, and culture, and forms the cognitive initiative of the team based on social media and cloud computing, the optimization of analog decision-making under digital technology, and the intelligence of means based on artificial intelligence [13]. A cross-faculty, cross-regional, and cross-border open digital resource platform should

be established, with the digital post requirements combined, digital literacy improved, and digital knowledge and practice system clarified. The job requirements and market-oriented talent training should be clear, and according to intelligent production management, data application can improve digital skills. Local service should be combined to create college student entrepreneurship alliance. Knowledge sharing and creation activities should be established, such as human-machine interaction and knowledge community interaction, and a first-class entrepreneurial university should be built.

3.3. Diversified sources of resource acquisition

In traditional entrepreneurship, it is a long process for entrepreneurs to perceive entrepreneurial opportunities, resources, and market status. With the help of large-scale data and high information density, digital technology quickly provides low-cost and high-density information sources for entrepreneurs to improve their all-round perception of markets and resources.

Nambisan suggests that digital startups may also have access to more growth resources due to the fluidity of their borders. For example, in the search for entrepreneurial opportunities, entrepreneurial information can be obtained from big data. Digital entrepreneurial enterprises can generate new digital resources in the process of developing digital resources to meet customer needs. The digital economy improves the efficiency of resource allocation, and the data exerts the effect of industrial cluster resource integration with the help of industrial Internet platform. Digitalization promotes the reshaping of factor flow mechanism, integrates online and offline resources, and improves resource allocation efficiency. The application of digital technology can reduce market search costs, bargaining costs, information communication costs, and operating costs, and promote the cross-regional flow of capital and labor, thereby improving the market matching efficiency of capital and labor. Data information helps enterprises to grasp market information, consumer preferences, supply chain information, and market forecasting to avoid resource misallocation and waste. Big data information provides potential entrepreneurs with market information, product information, and customer information, which is convenient for entrepreneurs to explore market opportunities, successfully search for entrepreneurial projects, perceive changes in market information, and make decisions.

3.4. Establishment of a value co-creation mechanism

The platform of digital economy realizes value co-creation by reconstructing industrial chain resources and optimizing resource allocation. Taking Xiaomi as an example, with the help of platformization, consumers can participate in product development and production, and the value co-creation between start-ups and consumers is realized. The innovation and entrepreneurship education ecology integrates scientific research and development, incubation center, practice platform, enterprise industrial resources, and other resources to build a collaborative innovation ecosystem. In terms of digitization, American universities have established a complete operation and data management system, and have a shared integrated digital data platform, and digital culture is widely popularized. For example, in terms of digital ecology, the University of Wisconsin reconstructs system-wide ecological resources and builds a number of services for college students, such as cross-campus, internal and external collaborative practice, personalized education, and project data support. In addition to establishing its own Huawei University, Huawei has also established industry-university-research partnerships with Tsinghua University, Hebei University of Technology, Greater Bay Area University, Macao University of Science and Technology, and other universities, and carried out in-depth cooperation in “science and education production” and “University + leading enterprises.” Zhejiang University and Alibaba jointly established the Yuanyu Technology Research Center, which has achieved research achievements in green transportation, “Tianmu-1” superconducting quantum chip, and other fields. Yunqi Town Industrial Park, a typical characteristic town of Zhejiang’s digital

economy development, embodies the good interaction between Hangzhou government, industry, and universities, and has spawned a number of digital projects based on big data and other digital technologies.

4. Development strategy and path

The development path of innovation and entrepreneurship education under the digital economy is as follows.

(1) Establishing digital management organization

In terms of organizational structure, a unified organizational structure should be established to strengthen the digital value system and coordinate the utilization of multi-subject and multi-party resources. In the United States, for example, Stanford University established the Office of Digital Education in 2021 and the Stanford Entrepreneurship Network platform to coordinate and integrate educational resources on campus. A digital organization is established to manage and integrate digital entrepreneurship education resources, such as digital courses, online interactive communication and evaluation mechanisms, entrepreneurship competition portals, and digital services and practice platforms.

(2) Reconstructing educational infrastructure and reforming educational content and methods

The new education model is mainly reflected in the educational concept of digital entrepreneurship education, which integrates the principles of service, data, systematization, sharing, user core, individuation, experience, and scenario. The teaching process should be rebuilt, the education supporting system should be reshaped, the education concept should be developed and innovated, the education content should be reconstructed, the school-running mode and teaching mode should be reformed and innovated.

The construction of digital infrastructure for entrepreneurship education should be strengthened on campus. A big data center that integrates teaching, practice, high-quality entrepreneurial resources, and competitions should be set up. The full coverage of management information system has not yet been formed, and the ability of data to support decision-making is insufficient. The application level of information-supported education and teaching needs to be improved urgently, and valuable innovative applications are few. Using big data, the digital evaluation system of entrepreneurship education is constructed, and the whole chain of data is realized from course production, offline course analysis, course evaluation system, feedback mechanism, correction, and update.

Human-computer interaction should be formed under digital education, with the help of digital platforms, Internet technology, meta-universe development, through "online and offline integration," "virtual and real integration" to build multi-subject interaction and good teacher-student relationship. The interactive mechanism under the collective knowledge system, evaluation system, practice system, and interaction system is formed. Relying on virtual reality, augmented reality, intelligence, and other technologies, we emphasize the use of experiential teaching, participatory teaching, and situational teaching, and give full play to the application of digital technology in classroom teaching and practical training scenarios to improve the quality of talent training.

A mixed education model of online education and digital technology should be formed. Digital technology takes digital components (such as mobile phone apps, electronic chips, etc.), digital platforms (open-source network communities under the iOS system and Android system), and digital infrastructure (network platforms, online communities, etc.) as important content. The communicability, associativity, expansibility, interactivity, perceptibility, and contextuality of digital technology are emphasized, and the integration of online and offline, domestic and foreign entrepreneurial education resources of digital entrepreneurship education is achieved. Moreover,

online education and mixed education are realized with digital technology, giving full play to the role of flipped classroom in teaching, realizing the application of multi-dimensional discussion, experiential, mixed, digital intelligence, and simulation methods, thus achieving college students' independent learning and multi-channel learning, and teachers' easy access to learning data.

(3) Establishing a mechanism of entrepreneurial resource sharing and value co-creation under the multi-subject participation mechanism

The ecosystem of innovation and entrepreneurship education gathers the participation of multiple subjects, which jointly affects the cultivation of innovative and entrepreneurial spirit and quality of college students. The subjects involved include government agencies, universities, industrial resources, social resources, and so on. A platform cooperation mechanism is established for science and technology research and development cooperation platform, education resource sharing platform, industrial information cooperation platform, venture capital cooperation platform, human resources exchange platform, etc., through the infrastructure level (website, public account, application software and technology development, etc.), data level (capital resource data, education resource data, industry information data, policy data), and the realization of the goal level (value creation). At present, many innovation and entrepreneurship participants, such as science and technology parks, incubators, technology markets, service platforms, entrepreneur resources, and financing institutions, have fully gathered talents, policies, capital, technology, information, and other factors in the participation, forming a development mechanism for entrepreneurial cooperation, business incubation, and scientific and technological innovation. There is a situation of multiple subjects acting independently, and there is little communication and cooperation between them. With the help of digital resource sharing mechanism, a talent resource platform is built to realize the talent resource utilization mechanism of diversified teachers, diversified technical personnel, and comprehensive service management personnel for entrepreneurial projects. The innovation and trial-and-error functions of the incubation space platform (virtual makerspace) are fully utilized, and the market information, production materials, technical resources, and human resources mastered by the enterprise are used to carry out its own innovation projects. A mechanism to evaluate, monitor, and control the quality of talent training is established, a talent station model for the mutual use of production, university, and research is formed, the flow of personnel is encouraged, and borrowing, hiring or part-timing are adopted to achieve the agglomeration of outstanding talents in universities, research institutes, and enterprises. To realize the comprehensive resources required for college students' entrepreneurial practice, online and offline all-channel guidance and support mechanism should be established. The entrepreneurship of scientific research teams should be emphasized, mobile, networked, and open platforms for the entrepreneurship of academic teams should be provided in colleges and universities, and multi-agent collaborative innovation mechanism should be established. The management system of resource sharing for different majors and practice platforms should be improved, and integrated into the whole process of innovation and entrepreneurship education as soon as possible[14].

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Disclosure statement

The authors declare no conflict of interest.

References

[1] Zaheer H, Breyer YA, Dumay JC, 2019, Digital Entrepreneurship: An Interdisciplinary Structured Literature Review and Research Agenda. Technological Forecasting and Social Change, 2019(148): 119735.

[2] Hull CE, Hung YTC, Hair N, et al., 2007, Taking Advantage of Digital Opportunities: A Typology of Digital Entrepreneurship. International Journal of Networking and Virtual Organisations, 4(3): 290–303.

[3] Nambisan S, 2017, Digital Entrepreneurship: Toward a Digital Technology Perspective of Entrepreneurship. Entrepreneurship Theory and Practice, 41(6): 1029–1055.

[4] Yu J, Meng Q, Zhang Y, et al., 2018, Digital Entrepreneurship: The New Trend of Entrepreneurship Theory and Practice in the Digital Age. Research in Science of Science, 2018(10): 1801–1808.

[5] Liu Z, Lin S, Xing X, 2021, Digital Innovation and Entrepreneurship: New Paradigm and New Progress. Research and Development Management, 2021,33(1):1-11.

[6] Zhu X, Liu Y, Chen H, 2019, Digital Entrepreneurship: Research on Elements and Kernel Generation Mechanism. Foreign Economics and Management, 42(04): 19–35.

[7] Ma Y, Wang L, 2022, Exploration of Digital Entrepreneurship Education Model Based on Entrepreneurial Cognition Theory – A Case Study of Carnegie Mellon University. Higher Engineering Education Research, 193(02): 166–172.

[8] Huang Y, Zhang Y, 2023, Analysis on the Organizational Construction of Entrepreneurship Education in Research Universities in the Digital Era. Journal of Wenzhou University (Social Sciences Edition), 36(03): 61–72

[9] Wang P, 2023, Meta-Universe Enabling Innovation and Entrepreneurship Education in Universities: Internal Mechanism and Practical Path. Higher Engineering Education Research, 200(03): 155–160.

[10] Lei J, Chen J, 2021, Curriculum and Instructional Design of University Digital Entrepreneurship Education: Based on the Perspective of Design Thinking. Educational Development Research, 41(11): 32–38.

[11] Garbuio M, Lin N, 2019, Artificial Intelligence as a Growth Engine for Health Care Startups: Emerging Business Models. California Management Review, 61(2): 59–83.

[12] Zhang Y, Yan Z, Xiao Y, et al., 2023, Multi-Team Dynamic Collaboration in Enterprise Digital Transformation: Concept, Research Framework and Prospect. Journal of Hainan University (Humanities and Social Sciences Edition), 2023: 1–9.

[13] Jia J, Liu M, 2021, Digital Entrepreneurship Team: Connotation, Characteristics and Theoretical Framework. Research and Development Management, 33(01): 101–109.

[14] Zhuang T, 2018, The Three-Spiral Relationship between Government, Industry, University and Research from the Perspective of Resource Integration, China Social Sciences Press.