

# DIGITAL LITERACY CULTIVATION FOR LIBERAL ARTS COLLEGE STUDENTS IN THE AI ERA: DIFFICULTIES, PATHS AND MECHANISMS

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**ABSTRACT**-With the rapid development of AI technologies represented by generative artificial intelligence (AIGC), it has exerted a subversive impact on knowledge production, thinking modes, professional abilities and ethical norms in the humanities and social sciences, profoundly changing the training environment and demand orientation of liberal arts talents. Improving the digital literacy of liberal arts college students has transformed from a traditional "additional skill" to a "core literacy" adapting to the development of the times, which is directly related to the effectiveness of new liberal arts construction, the future competitiveness of liberal arts talents, and the inheritance and innovation of the humanities and social sciences. This study adopts multiple research methods including literature research, questionnaire survey, case analysis and interview method, takes liberal arts majors of Nanjing University of Finance and Economics as a case, systematically analyzes the practical difficulties of digital literacy cultivation for liberal arts college students in the AI era, constructs a hierarchical, classified and operable four-stage progressive cultivation path of "cognition-integration-criticism-innovation", and explores the collaborative mechanism to ensure its long-term operation. It is expected to provide theoretical reference and practical solutions for universities to deepen education and teaching reform, innovate liberal arts talent training modes, and solve the dilemma of liberal arts digital transformation, and help cultivate "digital + humanities" compound liberal arts talents adapting to the needs of the AI era.

**INDEX TERMS**-Artificial Intelligence; Liberal Arts College Students; Digital Literacy; Cultivation Path; Mechanism Innovation; New Liberal Arts; AIGC

## 1. INTRODUCTION

At present, generative artificial intelligence technologies represented by ChatGPT and ERNIE Bot are iterating rapidly, have deeply penetrated into various fields of humanities and social sciences, and reshaped the modes of knowledge production, academic research and practical application in liberal arts. AI technology is no longer a simple auxiliary support, but deeply involved in core links: it can complete basic work such as literature retrieval and data collation in academic research, quickly generate various texts in content creation, and give birth to new fields such as intelligent legal services and data journalism in practical application. This puts forward new requirements for liberal arts college students, who need to have abilities such as AI tool application and data thinking. However, traditional liberal arts education focuses on the cultivation of humanistic literacy, leading to insufficient adaptability of students and difficulty in matching the needs of the times.

China attaches great importance to educational digitalization and new liberal arts construction. The Ministry of Education has successively issued policies such as the \*Education Informatization 2.0 Action Plan\* and \*Opinions on Promoting Educational Digitalization\*, which clearly require improving teachers' and students' digital literacy and promoting the deep integration of digital technology and education and teaching. The construction of new liberal arts further emphasizes the integration of humanities and social sciences with disciplines such as AI to cultivate compound talents. Under this guidance, various universities are promoting the digital transformation of liberal arts, but most are still in the exploratory stage due to the lack of systematic paths and guarantee mechanisms.

In the AI era, the "digital + humanities" composite ability has become the core employment demand for liberal arts graduates, and talents with digital skills are required in fields such as journalism, law and management. However, the survey shows that only 28.3% of liberal arts college students can proficiently use AI tools, and 42.1% have cognitive biases such as "technology useless theory" and "technology substitution theory". There is a significant gap between digital literacy and employment demand, which restricts the competitiveness of talents and the digital development of the humanities and social sciences.

### **1.1 Research Significance**

This study enriches the theory of digital literacy education in the liberal arts context, defines the core dimensions of digital literacy for liberal arts college students in the AI era, and makes up for the shortage of existing research on the particularity of liberal arts. It constructs a systematic research framework of "difficulties-paths-mechanisms", combines new liberal arts construction with AI application, and enriches the theory of higher liberal arts education reform. Taking Nanjing University of Finance and Economics as a case, it provides practical reference for similar studies. At the same time, it provides an operable digital literacy training program for liberal arts in universities, helps solve training difficulties and promote the digital transformation of liberal arts; guides students to establish correct digital cognition and improve comprehensive literacy and employment competitiveness; cultivates compound talents for the humanities and social sciences, and contributes to the construction of digital economy and cultural power.

## **2. DEFINITION OF CORE CONCEPTS AND LITERATURE REVIEW**

### **2.1 Artificial Intelligence (AI)**

This study specifically refers to a comprehensive system centered on generative artificial intelligence (AIGC), covering technologies such as machine learning and natural language processing. Its core feature is to simulate human thinking to complete tasks such as knowledge production and data analysis. In the field of liberal arts, it is mainly applied to links such as literature analysis, content creation and digital humanities research, and is the core driving force for the digital transformation of liberal arts.

### **2.2 Liberal Arts College Students**

Refers to undergraduate and graduate students majoring in humanities and social sciences, covering literature, law, economics and other categories. Compared with science and engineering students, their knowledge structure is dominated by humanities knowledge, focusing on writing expression and humanistic literacy cultivation, having less exposure to digital technology and a sense of technical alienation, so digital literacy cultivation has its uniqueness.

### **2.3 Digital Literacy of Liberal Arts College Students in the AI Era**

Refers to the comprehensive ability of liberal arts college students to use digital technology and AI tools to solve practical problems to meet the needs of learning, research and employment in the AI era. It is the integration of humanistic literacy and digital skills, covering five core dimensions: AI tool application ability, data thinking and critical ability, digital humanities research methods, human-machine collaborative innovation ability, and digital ethics and security awareness. All dimensions constitute a complete system collaboratively.

### **2.4 Literature Review**

Foreign research on digital literacy started earlier, and UNESCO first proposed the relevant concept in the 1990s. In the AI era, scholars generally emphasize critical thinking, innovation ability and ethical awareness in digital literacy. For example, Jenkins (2022) proposed four core dimensions, and Selwyn (2023) emphasized the humanistic and critical nature of digital literacy in liberal arts. Foreign universities pay attention to interdisciplinary integration and practice orientation,

but their research is based on their own education system and cultural background, which is different from the needs of new liberal arts in China, and lacks systematic research on training paths and mechanisms.

Domestic research on digital literacy began in the early 21st century and became a hot spot in liberal arts talent training after the rise of AI. In the research of core concepts, Zhang Min et al. (2022) and Li Juan et al. (2023) respectively defined the dimensions of digital literacy; in the research of training difficulties, it focuses on problems such as cognitive bias and imperfect curriculum; in the research of path mechanisms, ideas such as "general education + professional education + practice" are put forward, and some university case references have appeared.

Existing research has four deficiencies: insufficient discussion on the particularity of liberal arts digital literacy, scattered difficulty analysis, lack of operability in training paths, and imperfect long-term mechanism design. This study takes Nanjing University of Finance and Economics as a case, focuses on training difficulties, constructs a four-stage progressive path and collaborative mechanism, and makes up for the shortcomings of existing research.

### **3. RESEARCH OVERVIEW AND METHODS**

#### **3.1 Research Overview**

Based on the perspective of higher education managers, combined with the requirements of new liberal arts and the case of Nanjing University of Finance and Economics, the core goal of this study is to clarify the training requirements of digital literacy for liberal arts college students, diagnose difficulties, and construct paths and guarantee mechanisms, so as to provide practical solutions for universities. The research idea follows "difficulty diagnosis-path construction-mechanism guarantee", covering liberal arts teachers and students in multiple universities, focusing on relevant majors of Nanjing University of Finance and Economics as the empirical object.

#### **3.2 Research Methods**

This paper adopts the following research methods:

- a. Literature Research Method: Systematically consult relevant literature on digital literacy, AI and education, sort out the current situation, define concepts, and provide theoretical support.
- b. Questionnaire Survey Method: 5250 questionnaires were distributed, and 5086 valid questionnaires were recovered (effective recovery rate 96.9%), collecting data to support difficulty diagnosis.
- c. Case Analysis Method: Taking Nanjing University of Finance and Economics as the core case, analyze its training experience and deficiencies to enhance the practicality of the research.
- d. Interview Method: Conducted 32 in-depth interviews, covering university managers, liberal arts teachers and enterprise HR, to enrich the research content.

### **4. DIAGNOSIS OF DIFFICULTIES IN DIGITAL LITERACY CULTIVATION FOR LIBERAL ARTS COLLEGE STUDENTS IN THE AI ERA**

Combined with the survey and the case of Nanjing University of Finance and Economics, this study systematically diagnoses the practical difficulties of digital literacy cultivation from four levels: individual, curriculum, department and university, and draws the following conclusions.

#### **4.1 Student Level: Prominent Cognitive Bias and Insufficient Learning Motivation**

The prominent manifestations are:

- a. Widespread technical alienation and fear of difficulty: 67.2% of liberal arts college students believe that digital technology has low relevance to their majors, and 58.3% feel difficult to operate AI tools. This performance is more obvious in traditional liberal arts majors, and some students actively avoid relevant learning practices.

b. Extreme cognitive bias: 42.1% hold the "technology useless theory", and 38.5% are unwilling to actively learn digital skills; some students over-rely on AI, weakening their critical and innovative abilities, and even have problems such as homework plagiarism.

c. Insufficient active learning and transfer motivation: Only 23.7% will actively learn AI technology, and 31.4% do not know how to apply digital skills to professional learning, with low participation in general course practice.

#### **4.2 Teacher Level: Insufficient Integration and Traditional Teaching Mode**

The prominent manifestations are:

a. Insufficient depth of curriculum integration: 68.9% of students said that their universities have not offered special digital literacy courses for liberal arts, and 72.3% believe that existing digital courses have low relevance to their majors. Most traditional liberal arts major curriculum systems lack relevant content.

b. Traditional teaching methods: 75.6% of students reported that liberal arts courses are mainly lecture-based, and 69.8% said that teachers do not use AI for teaching. Some teachers are difficult to carry out innovative teaching due to insufficient digital literacy.

c. Shortage of teacher literacy: 63.4% of liberal arts teachers said that their own digital literacy is insufficient, and 57.8% have not participated in systematic digital skills training, with lagging teaching concepts and lack of integration awareness.

#### **4.3 Department Level: Lack of Evaluation Incentives and Insufficient Interdisciplinary Collaboration**

The prominent manifestations are:

a. Insufficient evaluation incentives: 70.2% of teachers said that departmental evaluation does not attach importance to digital teaching innovation, and 65.7% believe that relevant work has little impact on their own promotion, with low weight of digital achievements.

b. Lack of interdisciplinary collaboration: There is a lack of normalized cooperation between liberal arts departments and science and engineering departments, with weak internal digital culture and lack of experience exchange among teachers.

c. Insufficient planning: 68.3% of department managers have not incorporated digital literacy cultivation into the overall planning, and 71.5% of students said that the department has not carried out relevant practical activities, resulting in fragmented training work.

#### **4.4 University Level: Lack of Resources and Inadequate Industry-University Integration**

The prominent manifestations are:

a. Resource scarcity: 73.6% of students said that there is a lack of AI teaching platforms and datasets suitable for liberal arts, and 67.9% of teachers reflected a lack of digital teaching cases. Most university-level platform resources are oriented to science and engineering.

b. Lagging practice platforms: 69.4% of students said that there is a lack of digital literacy practice platforms, and 74.2% have not participated in school-enterprise digital practice projects. The construction of on-campus digital laboratories is insufficient, and school-enterprise cooperation mostly stays on the surface.

c. Unreasonable resource investment: 65.8% of teachers said that the university has insufficient investment in digital literacy cultivation for liberal arts, and 70.1% of students reflected that practical equipment cannot meet the demand, with resource investment tilted towards science and engineering.

## 5. CONSTRUCTION OF DIGITAL LITERACY CULTIVATION PATH FOR LIBERAL ARTS COLLEGE STUDENTS IN THE AI ERA

Combined with the core dimensions of digital literacy and training difficulties, and drawing on the experience of Nanjing University of Finance and Economics, this study constructs a four-stage progressive cultivation path of "cognition-integration-criticism-innovation", which is promoted hierarchically and step by step.

### 5.1 Improve AI Cognition, Break Technical Barriers and Lay a Digital Foundation

For all liberal arts students, the core is to break the sense of technical alienation and cognitive bias, and master basic digital skills.

a. Offer compulsory general courses: Such as \*Digital Literacy and AI Application\*, explaining the application of AI tools in the field of liberal arts. This course of Nanjing University of Finance and Economics covers all liberal arts majors with good results.

b. Carry out popularization activities: Hold AI tool training, digital skills competitions, etc. The "Digital Literacy Culture Festival" of Nanjing University of Finance and Economics has effectively stimulated students' interest in learning.

c. Build a basic practice platform: Build a university-level digital literacy training center, open AI tools and software for students' independent practice.

### 5.2 Strengthen Discipline Integration, Base on Professional Needs and Improve Application Ability

Promote by major, the core is to realize the deep integration of digital skills and professional learning.

a. Develop "AI + Professional" integrated courses: Offer \*Digital Document Analysis\* for history majors, \*Data Journalism Production\* for journalism majors, etc. Relevant majors of Nanjing University of Finance and Economics have formed multiple integrated course modules.

b. Adopt project-based teaching: Guide students to use AI tools around professional projects to improve skill transfer ability.

c. Form professional practice groups: Such as data journalism and digital humanities groups, carry out collaborative practice under the guidance of teachers. Relevant groups of Nanjing University of Finance and Economics have won provincial awards.

### 5.3 Strengthen Critical Thinking and Adhere to Ethical Bottom Line

For senior students and graduate students, the core is to cultivate critical thinking and ethical awareness.

a. Offer thematic seminar courses: Such as \*AI Ethics and Humanistic Speculation\*, guiding students to discuss AI ethical issues. Teachers from multiple majors of Nanjing University of Finance and Economics teach together to improve students' speculative ability.

b. Carry out case analysis and debate: Strengthen critical ability through typical case analysis and thematic debate.

c. Strengthen digital ethics education: Integrate ethical norms into teaching, and guide students to adhere to the bottom line through case warnings.

### 5.4 Base on Real Scenarios and Cultivate Innovation Ability

For all students, the core is to realize the transformation from "AI users" to "human-machine collaborative innovators".

a. Deepen industry-university integration: Co-construct practice bases with iFLYTEK Co., Ltd., Jiangsu Broadcasting Corporation, etc., to provide real projects. Multiple practice bases of Nanjing University of Finance and Economics have effectively improved students' innovation ability.

b. Rely on competitions and scientific research projects: Encourage students to participate in competitions such as the "Challenge Cup" and "College Students' Innovation and Entrepreneurship Competition", and participate in teachers'

scientific research projects to improve scientific research and innovation ability.

c. Carry out digital humanities workshops: Cultivate innovative achievements such as digital literature databases, and strengthen comprehensive application ability.

## **6. DESIGN OF LONG-TERM MECHANISM FOR DIGITAL LITERACY CULTIVATION FOR LIBERAL ARTS COLLEGE STUDENTS IN THE AI ERA**

From five aspects: interdisciplinary collaboration, teacher development, resource guarantee, evaluation incentive and long-term governance, design a collaborative mechanism to ensure the normalization and high-quality promotion of training work.

### **6.1 Establish an Interdisciplinary Collaborative Education Mechanism**

Establish a tripartite collaborative mechanism of "liberal arts departments + computer/data colleges + experimental teaching center":

a. Form a virtual teaching and research office: Clarify the responsibilities of all parties, regularly discuss curriculum and practice arrangements. The virtual teaching and research office of Nanjing University of Finance and Economics has achieved remarkable results.

b. Carry out interdisciplinary curriculum co-construction and project cooperation: Promote the integration of humanities and digital technology, and organize collaborative innovation of liberal arts and science and engineering students.

c. Establish an exchange mechanism: Hold teaching seminars and skill salons to promote knowledge complementarity between teachers and students.

### **6.2 Establish a Teacher Development Support Mechanism**

Improve teacher literacy and strengthen teaching ability.

a. Set up special funds and incentive policies, and incorporate digital teaching achievements into teacher evaluation and appointment indicators. The special fund of Nanjing University of Finance and Economics has effectively mobilized teachers' enthusiasm.

b. Carry out hierarchical and classified training, design training content for teachers of different age groups, and invite experts and technical personnel to give lectures.

c. Introduce compound teachers, encourage teachers to cooperate with enterprises and science and engineering teachers, and improve interdisciplinary ability.

d. Establish a "technical mentor" system to pair up and help liberal arts teachers solve digital teaching problems.

### **6.3 Establish a Resource Platform Co-construction and Sharing Mechanism**

Improve resource guarantee and utilization efficiency.

a. Build a university-level digital literacy resource platform for liberal arts, gather high-quality courses, cases and other resources, and open them to teachers and students.

b. Promote the co-construction and sharing of resources among universities, enterprises and local governments, and encourage teachers to develop digital resources.

c. Improve practice platforms, accelerate the construction of digital humanities laboratories, deepen school-enterprise cooperation, and strengthen practical support.

d. Optimize resource allocation, tilt 25% of the annual digital resource investment to liberal arts, and establish a dynamic adjustment mechanism.

#### 6.4 Reform the Evaluation and Incentive Mechanism

Strengthen the guiding role and stimulate the endogenous motivation of teachers and students.

a. Reform student evaluation: Incorporate digital practice achievements and AI tool application ability into academic evaluation, with relevant indicators accounting for no less than 30% in course assessment, and encourage graduation theses to integrate digital technology.

b. Improve teacher evaluation: Break the "paper-only" orientation, increase the weight of digital teaching achievements, and give preferential treatment to excellent teachers.

c. Establish multiple incentives: Set up a special reward fund to commend excellent teachers and students, and incorporate training effectiveness into departmental performance appraisal.

#### 6.5 Establish a Long-term Governance and Ecological Construction Mechanism

Digital literacy cultivation is a long-term systematic project, which requires strengthening top-level design.

a. Establish a university-level leading group for digital literacy cultivation, make overall plans for training work, coordinate all resources, regularly evaluate the effectiveness and optimize the plan.

b. Create a digital innovation culture, encourage teachers to explore new teaching modes, tolerate mistakes in practice, and build an exchange and display platform.

c. Establish a dynamic adjustment mechanism, track the changes of AI technology and employment market, and update training objectives, curriculum content and mechanism design in a timely manner.

d. Strengthen publicity and guidance, break cognitive biases through campus media and special lectures, and create a good atmosphere for full participation.

### 7. CONCLUSION AND PROSPECT

Through investigation and case analysis, this study finds that there are four major difficulties in digital literacy cultivation for liberal arts college students in the AI era: individual cognitive bias, insufficient curriculum integration, lack of departmental collaboration, and lack of university resources. Based on this, the constructed four-stage progressive cultivation path of "cognition-integration-criticism-innovation" fits the cognitive characteristics and professional needs of liberal arts students, and has strong operability. The five supporting long-term mechanisms form a complete system of "path implementation-mechanism guarantee-ecological support", which can effectively solve the training difficulties and promote the normalization of digital literacy cultivation. The practice of Nanjing University of Finance and Economics shows that this path and mechanism can significantly improve students' digital skills and teachers' teaching ability, and provide practical reference for similar universities.

With the continuous iteration of AI technology, the connotation and training needs of digital literacy for liberal arts college students will continue to change. Future research can be deepened from three aspects: first, expand the scope of investigation to cover different levels of universities, and further refine the differences in digital literacy cultivation for different liberal arts majors; second, track the development of AI technology, explore the application of new technologies such as AIGC in the training path, and optimize curriculum content and practice modes; third, strengthen empirical research, conduct long-term tracking of the implementation effectiveness of the training path and mechanism, and continuously improve and optimize, so as to provide more targeted theoretical and practical support for the digital transformation of liberal arts.

## BIOGRAPHIES

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