

# Institutional Empowerment, Technological and Cultural Equity: A Multidimensional Governance Model for University Education to Bridge the Gender Digital Divide

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## Abstract

Against the backdrop of the comprehensive advancement of China's "Digital China" strategy, the issue of the gender digital divide has become increasingly prominent, manifested in women's systemic disadvantages in accessing digital skills, opportunities for technology use, and participation in digital occupations. As a core venue for technology dissemination and talent cultivation, universities urgently need to explore a collaborative governance path integrating institutional empowerment and technological equity. This study finds that the gender digital divide in university environments is shaped by the interplay of multiple structural barriers, including institutional, technological, and cultural factors, which demands systematic governance strategies. By systematically analyzing the current status of gender disparities in university digital education, this research constructs a three-dimensional "Institution-Technology-Culture" governance model and proposes a comprehensive governance plan. Drawing on the experience of successful domestic and international cases, it refines replicable governance paths suitable for China's national conditions, aiming to provide theoretical reference and practical guidance for promoting gender equality in higher education.

## Keywords

Gender Digital Divide; Institutional Empowerment; Technological Equity; Multidimensional Governance Model; University Education

## 1. Introduction

With the in-depth advancement of Digital China construction, the popularization of digital technology is profoundly transforming social structures and people's lifestyles. The "Overall Layout Plan for Digital China Construction" proposes that by 2025, significant progress should be made in Digital China development, with efficient con-

nectivity of digital infrastructure, accelerated improvement in the scale and quality of data resources, and substantial enhancement in the quality and efficiency of the digital economy. [1] However, as a prominent issue in the field of social equity in the digital era, the gender digital divide severely restricts the coordinated development of the overall social digitalization process. Currently, the gender digital divide has evolved from traditional disparities in device access to multi-level differentiation in digital skill mastery, technological application effectiveness, and digital career development. Women are in a systemic disadvantaged position in the acquisition, application, and innovation of digital technology. [2]

As a core hub for digital talent training and technology dissemination, universities bear important responsibilities and possess unique advantages in bridging the gender digital divide. Although the overall gender gap in China's education sector is continuously narrowing, the underrepresentation of women in key digital fields such as STEM (Science, Technology, Engineering, and Mathematics) remains a severe problem. [3] Failure to effectively address this structural imbalance will not only hinder the realization of educational equity but also restrict the comprehensive improvement of national digital competitiveness.

Academic research on the gender digital divide is constantly deepening, with its focus shifting from the initial first-level "access divide" (focusing on equality in device and internet access) to the deeper second-level "use divide" (focusing on differences in digital skills and depth of use) and third-level "benefit divide" (focusing on differences in the ability to convert technological benefits into practical opportunities). [4] Meanwhile, the issue of algorithmic bias emerging in the development of digital technology has attracted widespread attention. Gender biases in real society are brought into the digital world through algorithm design and data training, giving rise to new forms of digital gender discrimination. Implicit gender discrimination in digital technology and gender-based violence in digital spaces are manifestations of gender inequality in the development of digital information. [5]

Against this background, this study systematically analyzes the current status of gender disparities in university digital education, constructs a comprehensive governance framework, draws on successful domestic and international experiences, and explores governance paths for the gender digital divide in universities suitable for China's national conditions. It aims to provide theoretical support and practical reference for promoting digital educational equity and advancing Digital China construction.

## **2. Practical Dilemmas and Cause Analysis**

### **2.1. Multidimensional Manifestations of Gender Disparities in University Digital Education**

Currently, gender disparities in China's university digital education exhibit complex and implicit characteristics. At the level of basic digital technology access, with the

popularization of mobile internet, the traditional gender gap in digital device access has narrowed significantly. However, gender differences remain evident in digital skill mastery, professional selection preferences, and technological innovation and application.

The gender imbalance in STEM majors is a concentrated manifestation of gender disparities in digital education. Data shows that although the proportion of women in the gross enrollment rate of higher education in China has exceeded that of men, the proportion of female students in key digital fields such as computer science, artificial intelligence, and engineering technology is generally low.

Gender differences in participation in digital skills training also cannot be ignored. In digital skills training, programming competitions, and technological innovation projects organized by universities, the participation rate of female students is generally low. Moreover, as the difficulty and competitiveness of projects increase, the participation rate of female students shows a significant downward trend. This participation gap not only affects the actual improvement of women's digital skills but also reinforces the stereotype that "women are not suitable for technical fields."

## **2.2. Analysis of Multiple Barriers to the Gender Digital Divide**

The formation of the gender digital divide in university environments is influenced by the interaction of three types of barriers: institutional, technological, and cultural. Institutional barriers are mainly reflected in the gender blindness of digital education policies, the imbalance of resource allocation mechanisms, and the simplification of evaluation standards. Currently, university digital education policies in China generally lack gender sensitivity and fail to fully consider the differentiated needs of students of different genders in the process of digital technology learning. In addition, evaluation standards for digital skills are often designed around competitive and individualistic indicators, which are misaligned with the collaborative learning styles preferred by some female students.

Technological barriers stem from gender bias and algorithmic discrimination in the design of digital tools. Studies have shown that the learning resource recommendation algorithms of mainstream digital education platforms often unconsciously replicate gender stereotypes in real society. For example, programming learning platforms mostly push case projects related to traditional male interest areas such as game development and hardware control, while rarely involving diverse themes such as social services and culture and art, which implicitly reduces female students' learning interest. [6]

Cultural barriers are deeply rooted in social gender concepts and campus cultural atmospheres, mainly manifested in the persistent influence of digital gender stereotypes, the general lack of technological confidence among women, and the absence of role models. From the basic education stage, the stereotype that "males are more proficient in technology" begins to affect students' professional cognition and career

choices; after entering higher education, this concept is further strengthened through micro-situations such as classroom interaction and group collaboration.

**Table 1.** Analysis of Multidimensional Barriers to the Gender Digital Divide in Universities

| Barrier Type           | Specific Manifestations                                                            | Impact Level     | Typical Cases                                              |
|------------------------|------------------------------------------------------------------------------------|------------------|------------------------------------------------------------|
| Institutional Barriers | Gender-blind policies, uneven resource allocation, simplified evaluation standards | Macro Structure  | Low proportion of female enrollment in STEM majors         |
| Technological Barriers | Algorithmic bias, exclusive interface design, biased data training sets            | Meso Technology  | Gender tendency in case selection on programming platforms |
| Cultural Barriers      | Stereotypes, low domain identification, lack of role models                        | Micro Individual | Marginalization of interaction in technical classrooms     |

### 2.3. Deepening Trend and Intersectional Characteristics of the Digital Divide

The gender digital divide in contemporary university environments is showing an obvious deepening trend, specifically manifested in the transformation from the access divide to the skill divide and benefit divide. Specifically, the gap between female and male students in the use of basic digital tools is gradually narrowing, but the gap in advanced digital capabilities such as complex problem-solving, system design and development, and technological innovation and application persists or even widens. In terms of the result transformation and benefit acquisition of digital technology use, gender differences are particularly obvious. Female students often struggle to effectively convert their learned digital skills into innovation and entrepreneurship opportunities, scientific research outputs, and career development capital. The existence of this third-level digital divide (benefit divide) indicates that simply providing digital devices and basic training cannot fundamentally solve the problem.

In addition, the gender digital divide also presents significant intersectional characteristics, that is, gender factors intersect with variables such as geographical background, family socioeconomic status, and professional fields to form diverse disadvantaged situations. Studies have shown that female college students from rural backgrounds face dual disadvantages in digital skills learning, while female students majoring in humanities and social sciences have significantly restricted improvement in digital literacy due to the lack of systematic digital skills training and enhanced application scenarios.

## 3. Theoretical Framework and Governance Path Design

### 3.1. Construction of the Three-Dimensional "Institution-Technology-Culture" Governance Model

Based on an in-depth analysis of the current status of the gender digital divide, this study constructs a three-dimensional "Institution-Technology-Culture" governance

model. This model takes institutional empowerment as the core driver, technological equity as the tool support, and cultural reconstruction as the environmental foundation, forming an organic system of collaborative governance.

In the institutional dimension, it emphasizes the construction of a supportive digital education governance system through top-level design and policy optimization. Its core lies in fully integrating the principle of gender mainstreaming into the entire process of formulating, implementing, monitoring, and evaluating university digital education policies, and reconstructing the gender power structure in the field of digital education through institutional arrangements.

The technological dimension focuses on eliminating gender bias in digital tools and platforms, and creating a more friendly digital learning environment for female students through technological innovation. This dimension requires a shift from pure technological application to technological governance to ensure that technological development serves the goal of gender equality.

The cultural dimension strives to challenge and change gender stereotypes in the digital field, and build a campus cultural ecology that supports the development of women's digital capabilities. This dimension focuses on the transformation of the implicit environment, and reshapes gender identity in the digital field through narrative reconstruction, role model demonstration, and space reconstruction.

### 3.2. Design of Institutional Empowerment Paths

Governance at the institutional level needs to be systematically promoted from the following aspects:

Establish a gender-sensitive policy system. When formulating digital campus construction plans, digital curriculum syllabuses, and digital skills training programs, universities should fully incorporate a gender perspective and establish a gender impact assessment mechanism. Specific measures include: formulating a special "Gender Equality Action Plan for Digital Education" to clarify the goals and paths for improving women's digital literacy; conducting pre-evaluation of gender impacts before the introduction of digital education-related policies to ensure the inclusiveness of policy content.

Optimize resource allocation mechanisms. Increase resource inclination for women's participation in digital technology learning, establish a special development fund for women's digital skills, and provide start-up support for female students to participate in digital competitions, innovation projects, and entrepreneurship practices. In the enrollment of STEM majors and the selection of digital projects, explore a gender-balanced quota system to provide institutional incentives for women's participation in digital field learning.

Improve the monitoring and evaluation system. Establish a gender-disaggregated statistical monitoring platform for digital education, regularly collect and analyze data related to digital course enrollment, skill assessment, and project participation

by gender, incorporate gender equality indicators into the performance evaluation system of colleges and departments, and build a positive incentive mechanism for promoting gender equality.

### 3.3. Innovation of Technological Equity Programs

Governance at the technological level needs to be carried out from two dimensions: tool design and algorithm governance.

Develop gender-friendly digital learning tools. Universities can cooperate with technology enterprises to develop digital education products that adapt to the learning characteristics of female students, such as programming platforms emphasizing collaboration and technical learning tools providing diverse application cases. In the product development process, establish a participatory design mechanism involving student representatives of different genders to ensure that women's needs are fully considered.

Promote algorithm governance and AI empowerment. Develop intelligent tutoring systems based on artificial intelligence technology that can identify and adapt to the learning characteristics of students of different genders, providing personalized learning support for female students. At the same time, build open-source tools and datasets that eliminate gender bias to reduce the occurrence of algorithmic bias from the data source.

Strengthen digital technology ethics education. Add technical ethics content to digital literacy courses, improve students' ability to identify and criticize technical discrimination phenomena such as algorithmic bias and data discrimination, and cultivate a sense of responsible digital technology development and application.

### 3.4. Implementation of Cultural Reconstruction Strategies

Governance at the cultural level requires the adoption of multi-level and all-round promotion strategies:

Deconstruct gender labels in digital technology. Through curriculum reform, publicity activities, and campus media, actively challenge the stereotypical narrative that "technology is a male domain" and demonstrate the relevance of digital technology to diverse social needs. For example, add cases of female scientists' contributions to basic courses such as Introduction to Computer Science, and organize interdisciplinary discussions on technological applications.

Strengthen the power of female role models and mentors. Implement a "Female Technology Mentor Program," inviting female technical elites from industry and academia to serve as student mentors. Through a series of lectures, workshops, and one-on-one guidance, provide female students with emulable role models and personalized growth support.

Create an inclusive campus digital environment. Establish and strictly implement a zero-tolerance policy for gender discrimination and harassment in digital classrooms

and technical teams, clearly define the manifestations and handling mechanisms of implicit discrimination behaviors such as micro-aggression and stereotype reinforcement, and create a safe and inclusive digital learning space.

## 4. Cases and Practical Models

### 4.1. International Experience Reference

At the 2023 International Academic Seminar on "Education in the Digital Age: Opportunities and Challenges," EU experts proposed three types of digital divides—learning divides in learning outcomes, connectivity divides in infrastructure, and gender divides in learning groups—and designed hierarchical intervention strategies accordingly. Through the "Connect Women" project, EU universities not only ensure that female students have widespread access to high-speed digital connectivity but also specially design a mentor network and learning community to support the improvement of women's digital skills, effectively reducing the sense of isolation among women in digital technology learning. Project evaluation shows that female students participating in the project have significantly improved their digital skills confidence and career aspirations.

The German Federal Ministry of Education and Research launched the "Charter for Women in STEM Professions," aiming to address the employment difficulties faced by women in STEM professional fields, publicize and improve stereotypes, and attract more women to engage in STEM careers. [7]

The curriculum reconstruction practices of Monash University in Australia and Durham University in the UK are also worthy of reference. At the International Academic Seminar on "Education in the Digital Age: Opportunities and Challenges," these two universities shared their experience of significantly improving female students' participation and sense of achievement by reforming STEM teaching methods and increasing collaborative learning and contextualized projects. These practices indicate that integrating technology learning with social problem-solving can effectively stimulate women's learning motivation.

### 4.2. Domestic Innovative Practices

Domestic universities have made relevant attempts in this regard and achieved certain innovative practical results.

For example, Zhejiang University launched the "Female Scientists Growth Program," aiming to inspire female students in science and engineering and female researchers in universities to climb new heights in the scientific field and pursue more outstanding career goals. Since the implementation of the project three years ago, it has cultivated a number of outstanding female scientific research talents and built an excellent team of young female scientific researchers.

The middle school-university connection project of Beijing Normal University, based

on educational data mining, identifies key factors affecting girls' ICT participation and designs targeted transition support measures, effectively preventing the loss of women's digital interest during the educational transition period.

In response to the call of the Hubei Provincial Federation of Trade Unions, Huazhong University of Science and Technology organized the "Digital Intelligence Empowerment Training Class," striving to cultivate a group of "Digital Intelligence Mulan" with good integration of digital and real economies and innovative achievements. It has improved the ability of female industrial workers to innovate and create using digital intelligence technology.

### 4.3. Extraction of Replicable Experiences

Based on the analysis of the above domestic and international cases, we can extract the following replicable and promotable governance experiences:

**Multidimensional collaborative governance.** Successful practices have shown that single-dimensional interventions are difficult to sustainably narrow the gender digital divide, and systematic promotion of institutional, technological, and cultural measures is required. For example, EU projects have achieved remarkable results by combining infrastructure improvement with community support.

**Whole-cycle support system.** Establishing a whole-cycle support system from early intervention in the freshman year to career support in the senior year is crucial. The experience of the University of Oxford shows that early identification and support can effectively prevent female students from abandoning technical fields due to initial setbacks.

**Data-driven precise intervention.** Establish a gender digital divide monitoring system, identify key obstacles and optimal intervention timings based on data, and achieve precise governance. The practice of Beijing Normal University has demonstrated the value of data-driven decision-making in promoting gender equality.

**Multiplier effect of community support.** Building a supportive peer community and mentor network can generate a significant multiplier effect. Female technology communities not only provide emotional support but also serve as important channels for knowledge sharing and opportunity acquisition.

## 5. Conclusions and Prospects

By systematically analyzing the current characteristics and formation mechanism of the gender digital divide in universities, this study constructs a three-dimensional "Institution-Technology-Culture" governance model and proposes governance paths suitable for China's national conditions combined with domestic and international practical experiences. The research shows that gender equality in the digital era has evolved from a simple issue of device access to a complex social issue involving skill acquisition, application effectiveness, and benefit conversion, which requires systematic governance strategies.

As a key venue for digital talent cultivation, universities shoulder a special mission in bridging the gender digital divide. By promoting gender mainstreaming at the institutional level, inclusive design at the technological level, and anti-stereotype publicity at the cultural level, and building a multidimensional governance system, we can effectively promote gender equality in the field of digital education. Successful domestic and international cases indicate that early intervention, whole-cycle support, and data-driven precise governance are key factors in improving governance effectiveness.

Looking forward to the future, the governance of the gender digital divide in universities should be further deepened in the following aspects: first, focus on the construction of gender-inclusive mechanisms in cutting-edge technology fields such as artificial intelligence and the metaverse to prevent the replication of traditional gender inequality in emerging technology fields; second, attach importance to differentiated governance from an intersectional perspective, and pay attention to the special needs of diverse vulnerable groups such as rural women and ethnic minority women; finally, strengthen international comparison and local innovation, and explore governance paths suitable for China's social and cultural background while learning from international experiences.

Through continuous theoretical innovation and practical exploration, university education can play a more important role in bridging the gender digital divide and building an inclusive digital society, providing a solid talent foundation and a fair development environment for the construction of Digital China.

## References

- [1] The Communist Party of China Central Committee, The State Council. (2023) Overall Layout Plan for Digital China Construction [EB/OL]. [2023-03-27]. [http://www.gov.cn/xinwen/2023-02/27/content\\_5743484.htm](http://www.gov.cn/xinwen/2023-02/27/content_5743484.htm). DOI: None.
- [2] Sharma A P, Ojha J K. (2025) Analyzing the gender digital divide through powercube framework[J]. *Information Development*, 2025, 41(2): 145-162.
- [3] Zheng Xinrong, Wu Xiaowei. (2025) Ensuring Every Woman Enjoys Equitable and Quality Education——Progress, Reflections and Prospects of Gender Equality in Education in China Over the Past Five Years[J]. *Journal of Shandong Women's University*, 2025, 33(3): 15-24.
- [4] Huang Tianyu, Quan Yiyue. (2025) Narrowing the digital divide: The growth and distributional effect of internet use on income in rural China[J]. *China Economic Review*, 2025, 91: 102387.
- [5] Zhang Xiu. (2022) Analysis of Optimization Paths for Gender Equality Education in the Digital Age[J]. *Education Teaching Forum*, 2022(21): 13-16.
- [6] Zhang Wenhui. (2025) Implicit Barriers and Explicit Gaps: An Analysis of the Third-Level Gender Digital Divide on Digital Platforms[J]. *Journal of Shandong Women's University*, 2025, 32(2): 78-95.
- [7] Wu Menghui. (2025) Cultivation and Development of Female STEM Talents in Germany from the Perspective of the Theory of Planned Behavior[J]. *Journal of Comparative Education*, 2025(4): 17-30.