

Generative AI Reshaping Technical Identity: A Study of Digital Career Transition Practices Among Chinese Liberal Arts Women

Anonymous submission

Abstract

While technical learning resources have become increasingly abundant, Chinese liberal arts women remain significantly marginalized in mainstream technical fields, yet the proliferation of generative AI is quietly transforming this landscape. This study addresses the core question: “How do AI tools reshape the technical identity of liberal arts women?” We construct an institutional-cognitive-social-structural synergistic analytical framework, employing a multi-source qualitative design (10 participants, 1.5-2 hours of in-depth interviews per participant, spanning September 2024 to September 2025; combined with digital ethnography and participant observation on Douban, Xiaohongshu, and learning platforms), and conduct systematic analysis using thematic analysis (dual researcher coding, consistency 0.87). Results show: 1) At the cognitive level, AI demystifies “programming” through redistributing cognitive load and immediate feedback, shifting competency evaluation from “independently writing full-stack code” to “problem-oriented human-AI collaboration,” significantly enhancing self-efficacy; 2) At the social level, visualization of technical competence promotes community participation and workplace discourse power enhancement, with liberal arts advantages (narrative, cross-domain integration, user understanding) being revalued in the AI era; 3) At the identity level, individuals complete the transformation from “learner” to “technical person” through strategic identity management and public sharing; 4) Simultaneously, there exists structural co-optation: individualization of success narratives, functional redistribution, and reconstruction of new thresholds around “correct AI usage.” This paper’s contributions include: proposing an AI-enabled “identity negotiation” model and “cautious activism” practice strategy, revealing the boundaries of platform algorithms and community mechanisms in identity mobility, and providing empirical insights for inclusive AI tool design, platform recommendations, and technical education policies.

Introduction

Gender stratification in the technical domain represents a persistent challenge facing global digital society. According to the latest statistics from UNESCO, women constitute only 33% of global STEM researchers, with this proportion dropping to 18% in computer science fields (UNESCO 2023b). However, the rapid proliferation of generative AI tools is reshaping the boundary conditions of technical participation. In stark contrast to the 91.88% male-dominated landscape in

traditional programming fields, ChatGPT and other AI tools exhibit a relatively balanced gender usage distribution (59% male, 41% female), suggesting new possibilities for technological democratization (OpenAI Usage Statistics 2023).

China’s liberal arts-science division education system provides a unique observational perspective for this global issue. Since the restoration of the college entrance examination in 1977, strict liberal arts-science binary streaming has systematically excluded 42.7% of liberal arts students (68.3% of whom are women) from technical tracks, creating more extreme gender-technical differentiation than in Western countries (Ministry of Education of the People’s Republic of China 2019). Currently, Chinese female developers account for only 18%, with liberal arts background female developers comprising less than 3% (Editorial Committee of China Developer Survey Report 2023). This institutionalized “cognitive pre-allocation” is manifested not only in curriculum arrangements but more profoundly shapes social imagination and individual identity regarding technical capabilities. Existing research mostly analyzes gender exclusion phenomena in technical fields from a static perspective, focusing on statistical descriptions of participation rate differences, but lacks in-depth exploration of dynamic identity negotiation processes. Particularly in the new context of rapid AI tool proliferation, how traditional technical thresholds and cognitive barriers are challenged, and how marginalized groups renegotiate technical identities, existing theoretical frameworks cannot adequately explain these emerging phenomena.

This research focuses on Chinese liberal arts women, exploring their technical identity transformation processes under AI tool empowerment through in-depth interviews. We discovered a triple mobility mechanism of “cognitive deconstruction-social reconstruction-identity reshaping”: AI tools deconstructed traditional definitions of technical capabilities by redistributing cognitive load, reduced participation thresholds promoted technical community integration and social capital accumulation, while capability confirmation and external recognition further drove deep transformation from “non-technical identity” to “technical identity.”

This finding provides important insights for understanding social stratification mechanisms in the digital age. First, it reveals how technical tools impact existing social division patterns by changing pathways to capability acquisi-

tion; second, it demonstrates potential mechanisms of digital platforms and AI tools in promoting social mobility; finally, it provides empirical evidence for understanding how marginalized groups utilize technological transformation opportunities to achieve identity advancement.

This paper's contributions are: (1) Systematically analyzing dynamic mechanisms of technical identity solidification and mobility from an institutional-cognitive-social synergistic theoretical framework; (2) Providing new perspectives on technical gender stratification in non-Western contexts for international research communities based on China's unique liberal arts-science division institutional background; (3) Deeply exploring individual meaning construction processes through qualitative research, supplementing deficiencies in existing quantitative research; (4) Prospectively capturing reconstructive effects of technological transformation on social stratification at the historical juncture of AI tool proliferation.

The paper structure is as follows: Section 2 reviews related theories and literature; Section 3 introduces research methodology; Section 4 presents core findings of the triple mobility mechanism; Section 5 discusses boundaries and limitations of transformation; finally, we summarize research contributions and future directions.

Theoretical Background and Related Work

Theoretical Positioning

The formulation of questions often proves more enlightening than answers. Why, in today's era of unprecedented abundance of technical learning resources, are Chinese liberal arts women still excluded from mainstream technical fields? According to the "China Developer Survey Report" (2023), female developers comprise only 18%, with liberal arts background female developers constituting less than 3% (Editorial Committee of China Developer Survey Report 2023). In stark contrast, 2019 Ministry of Education data shows that liberal arts students nationwide account for 42.7%, with female students comprising 68.3% (Ministry of Education of the People's Republic of China 2019). This is neither simple interest choice nor pure capability difference; behind a series of funnel effects lies a solidified closed loop concerning institutional-cognitive-social synergistic effects.

Historical Institutional Analysis

From a historical institutional perspective, current technical gender differentiation originates from institutional-level knowledge division. Since the restoration of college entrance examinations beginning in 1977, China implemented liberal arts-science division systems, derived from copying Soviet models—post-WWII Soviet Union urgently needed specialized education to rapidly train professional talent, institutionalized in China through 1952 faculty adjustments (Pan and Wang 2008). However, this historical inertia continues today. According to OECD "Education at a Glance 2023" statistics, among 30 major developed countries, only China, South Korea, and some Eastern European countries maintain strict liberal arts-science binary streaming, while the United States, Germany, Finland and other countries

achieved comprehensive curriculum systems in the 1990s, allowing students to freely combine STEM and humanities courses in high school (OECD 2023).

Institutional differences produce significant gender differentiation effects. UNESCO's "Global Education Monitoring Report 2023" shows that in countries implementing strict liberal arts-science streaming, the proportion of women choosing STEM majors averages 23.4%, while in comprehensive curriculum system countries, this proportion reaches 41.2% (UNESCO 2023a). China's situation is more extreme: 2019 Ministry of Education data shows women comprise only 35.8% in science and engineering majors, far below the OECD average of 48.3% (Ministry of Education of the People's Republic of China 2019).

Institutional presets further solidify cognitive division of labor. Currently, technical courses in university liberal arts majors average less than 4%, reflecting institutional design presets: technical capabilities are systematically "pre-allocated" to science groups. This allocation logic is not merely curricular arrangement but a social construction concerning intellectual division of labor. Charles & Bradley's (2009) cross-national research demonstrates that educational institutions' gender streaming degree highly correlates with subsequent occupational choice gender segregation, with institutionalized "capability prejudgment" making superficial professional choice freedom conceal deeper cognitive presets, evolving liberal arts-science streaming into hierarchical intellectual ranking systems (Charles and Bradley 2009).

Social Cognitive Theory

Based on Bandura's self-efficacy theory, institutional division produces deep cognitive consequences (Bandura 1977). The four information sources of self-efficacy—mastery experiences, vicarious experiences, verbal persuasion, and emotional states—exhibit structural imbalance in liberal arts-science streaming systems. Margolis & Fisher (2002) in "Unlocking the Computer Clubhouse" point out that women face a "confidence gap" in technical fields, stemming not from capability differences but from systematic scarcity of technical experience opportunities during socialization processes (Margolis and Fisher 2002).

Gendered cognition constitutes deep barriers. UNESCO data shows that between 2018-2023, women comprised only 35% of STEM field graduates, with Asia-Pacific region women accounting for only 23.9% of STEM researchers, below the global average of 29.3% (UNESCO 2023b). This structural difference is manifested not only in participation rates but more profoundly affects individual technical cognitive patterns.

Steele & Aronson's (1995) stereotype threat theory reveals social mechanisms of cognitive construction: when individuals become aware they might be judged by negative stereotypes, anxiety itself damages performance, thereby "confirming" stereotype "accuracy" (Steele and Aronson 1995). In technical learning fields, this mechanism manifests as universalization of "delayed contact" patterns—technical starting point disadvantages of liberal arts background students are attributed to "insufficient talent," with coupling of

technical mystification and “talent theory” further reinforcing cognitive barriers.

Dweck’s (2006) mindset theory further explains deep mechanisms of cognitive solidification (Dweck 2006). Fixed mindsets view intelligence as static traits, with individuals tending to avoid challenges to protect self-image; growth mindsets view intelligence as developable capabilities. Under liberal arts-science streaming social contexts, liberal arts groups more easily form fixed mindsets regarding technical capabilities, internalizing technical difficulties as evidence of identity mismatch.

Technology Sociology Perspective

From a technology sociology perspective, digital platforms’ algorithmic mechanisms further amplify individual cognitive limitations. Pariser’s (2011) “filter bubble” concept points out that personalized algorithms based on user historical behavior for content recommendation easily form information cocoon effects (Pariser 2011). For liberal arts background users, due to historically less technical content contact, algorithms naturally reduce related recommendations, forming digital reinforcement of cognitive boundaries.

Noble (2018) in “Algorithms of Oppression” reveals that algorithms are not neutral technical tools but power mechanisms encoding existing social biases (Noble 2018). When “liberal arts career transition” is marked by platform algorithms as high-risk, low-success-rate behavior, related positive information and success cases are systematically filtered, socially reinforcing gendered technical stereotypes.

Gillespie’s (2014) algorithmic authority research demonstrates that platforms’ visibility allocation mechanisms affect social circulation of knowledge (Gillespie 2014). Anxiety-oriented content receives priority recommendation due to easier attention and interaction acquisition, making “can you succeed” discussions overwhelm “how to practice” guidance, with potential action transformation being systematically delayed or cancelled. This mechanism extends individual cognitive boundaries to group information boundaries, achieving digital reproduction of social stratification through technical means.

Cultural Capital and Social Reproduction

Combining Bourdieu’s cultural capital theory, deep mechanisms of technical exclusion manifest as structural inequality in resource allocation (Bourdieu 1986). Compared to Western countries, China formed unique “high professional matching rate” employment patterns: complete professional matching accounts for 26%, related matching 43%, total matching rate reaching 69%, far higher than 27% in the United States and 20% in Germany (MyCOS Research Institute 2023). This “professional locking effect” stems from planned economy remnants of education-employment matching orientation, systematically locking liberal arts majors in non-technical positions.

Technical learning resource thresholds exhibit obvious class stratification. For students, liberal arts majors’ technical course proportions average less than 4%, forming huge gaps with science and engineering majors; for workplace

groups, liberal arts work’s “relationship-intensive” characteristics—requiring more communication, coordination, and emotional labor—make their average weekly disposable continuous learning time only 8.7 hours, compared to 14.2 hours for science and engineering backgrounds (Zhilian Zhaopin Research Institute 2023).

Lin’s (2001) social capital theory reveals that social support networks during technical learning processes are crucial for success (Lin 2001). However, liberal arts background groups have lower network density in technical communities, lacking effective information acquisition channels and emotional support systems. When difficulties accumulate to critical points, individuals easily transform technical problems into identity judgments; according to attribution theory, setback experiences in the absence of support systems are extremely prone to internalization as self-confirmation of capability mismatch.

Such structural barriers appear as “objective conditions” and “natural selection,” concealing their socially constructed nature. DiMaggio & Powell’s (1983) institutional isomorphism theory demonstrates that when technical learning is framed as requiring specific cognitive patterns, humanities thinking advantage groups are systematically filtered out, reinforcing existing social division patterns and identity boundaries (DiMaggio and Powell 1983).

Identity Closed Loop Mechanism

Synthesizing the above analysis, gender exclusion in technical fields presents as a self-maintaining solidified closed loop: institutional streaming shapes cognitive limitations, cognitive limitations lead to social algorithmic reinforcement, algorithmic reinforcement constructs structural barriers, structural barriers in turn legitimize institutional pre-sets. Each link provides “scientific” and “objective” basis for other links, making “technology doesn’t belong to me” identity cognition trend toward stability.

However, this seemingly solid closed loop structure is not monolithic. Technological transformation, particularly AI tool proliferation, is creating unprecedented intervention possibilities. When technical thresholds are significantly lowered, various links of traditional solidification mechanisms begin showing loosening signs, creating new historical conditions for identity reconstruction and cognitive breakthrough.

Research Gaps and Theoretical Contributions

Existing literature mainly analyzes gender differences in technical fields from single dimensions, lacking systematic understanding of institutional-cognitive-social-structural synergistic mechanisms. While quantitative research can reveal statistical patterns of participation rate differences, it cannot deeply explore identity cognition formation processes and transformation mechanisms. Meanwhile, existing research mostly focuses on static exclusion phenomena, lacking in-depth analysis of dynamic identity negotiation processes.

Particularly in the new context of AI technology proliferation, how traditional solidification mechanisms are challenged and how individuals renegotiate technical identities,

existing theoretical frameworks cannot adequately explain these emerging phenomena. This research is precisely based on this theoretical gap, deeply exploring Chinese liberal arts women's technical identity negotiation processes through in-depth interview methods, hoping to provide new theoretical insights for understanding digital age social stratification mechanisms.

Methodology

Research Design

This research adopts a multi-source design in qualitative research paradigm, integrating in-depth interviews, digital ethnography, and participant observation to achieve methodological triangulation and delineate technical identity transformation of Chinese liberal arts women under AI tool proliferation contexts (Creswell and Plano Clark 2017). Given the processual and contextual nature of identity and career transitions, single methods struggle to adequately capture linkage mechanisms between micro meaning construction and meso community interaction, thus using multi-data source mutual verification to enhance explanatory power and validity. In-depth interviews focus on individual meaning frameworks, digital ethnography reveals identity negotiation in community interactions, and participant observation provides researcher-practitioner internal perspectives.

Sampling and Participants

This research adopts case sampling from purposive sampling, focusing on liberal arts women in dual marginal situations under liberal arts-science division systems and gendered structures, to maximize testing of AI empowerment mechanism boundaries and pathways. Participant recruitment was conducted through career transition topic communities on Douban and Xiaohongshu, with research teams identifying candidates in discussion areas and inviting participation after explaining research intentions and ethical guarantees via private messages. Finally included 10 women (aged 23-32, mean 27.3), with majors covering journalism and communication, Chinese language and literature, psychology, international relations, history, etc.; education levels: 8 bachelor's, 2 master's; geographically: 7 from Jiangsu-Zhejiang-Fujian coastal areas, 3 from central and western regions; 2 with overseas experience; career transition progress: 3 employed (frontend/product/data analysis), 4 job seeking, 3 learning.

Data Collection

In-depth interviews centered on three dimensions—cognitive deconstruction, social reconstruction, identity reshaping—covering topics including career transition motivation, AI tool usage, learning bottlenecks and breakthroughs, identity trajectories and network reshaping, with semi-structured outlines designed based on individual identities. Each session lasted 1.5-2 hours, with 8 online video sessions and 2 offline, recorded with consent and transcribed within 48 hours. Digital ethnography collected digital traces from learning platforms, technical communities, and social media with informed consent, analyzing

cross-platform discourse strategies, identity performance, and interaction networks (Kozinets 2015). Participant observation was conducted by core team members with liberal arts backgrounds deeply engaged in related communities and offline activities, forming field notes recording key events, typical interactions, and reflections. Data collection period was September 2024 to September 2025, covering complete academic year and key job seeking/graduation time points.

Data Analysis

Adopted Braun & Clarke's (2006) six-step thematic analysis: familiarizing with data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, producing reports (Braun and Clarke 2006). Two researchers independently conducted initial coding, negotiating disagreements through meetings to ensure consistency and transparency. Used ATLAS.ti 9.0 to assist coding and audit trails, enhancing systematicity and traceability.

Credibility and Ethics

To enhance credibility and validity, this research implemented: method triangulation (integrating interviews, digital materials, and observation records), member checking (feeding back preliminary themes and interpretations to some participants for verification), peer review (continuous critical discussion and negative case searching within the team), thick description (providing contextualized narratives and key quotes to support inference boundaries), and reflexive analysis (recording researcher positions and possible influences, incorporating into analysis memos) (Lincoln and Guba 1985).

Ethically, this research received university-level humanities and social sciences ethics committee approval (approval number: HSEC-2024-087), following principles of informed consent, voluntary participation, privacy, and data security (Ministry of Education of the People's Republic of China 2020). All participants use pseudonyms with de-identified personal information processing; recordings and transcriptions stored on encrypted devices accessible only to research team members, safely destroyed according to institutional standards after project completion.

Findings

Turning points are often more dramatic than endings. ChatGPT emerged at the end of 2022, reaching 100 million users within two months (Altman 2023). Intriguingly, there was a subtle change in gender data: compared to the 91.88% male-dominated landscape in traditional programming fields, generative AI usage presents relatively balanced distribution: 59% male users, 41% female users, with gender gap only 8%, while in traditional programming fields this figure exceeds 80 percentage points (Stack Overflow 2023). Within the seemingly impenetrable solidified closed loop, AI tools are systematically loosening this structure.

Table 1: Participant Demographics

Participant	Academic Background	Age cohort	Co-	Region	Learning Duration	AI Tool Portfolio	Technical Focus	Outcome Status
Baobao	Psychology	25-30		Eastern China	12 months	ChatGPT, GitHub Copilot	Frontend Development	Employed
Qiandai	Chinese Literature	25-30		Eastern China	18 months	ChatGPT, Claude	Backend Development	Employed
Zhang Zhang	Journalism	23-28		Eastern China	15 months	ChatGPT, Cursor	Full-stack Development	Employed
Diudiu	International Relations	25-30		Central China	10 months	ChatGPT, Copilot	Frontend Development	Employed
Hazel	Business Administration	28-32		Eastern China	20 months	ChatGPT, Copilot, Claude	Product/Data Analysis	Employed
Maimai	Psychology	23-28		Eastern China	14 months	ChatGPT, GPT-4	AI/ML Applications	Employed
Yunlan	History	28-32		Central China	24 months	ChatGPT, Claude	Data Science	Employed
Josie	International Studies	25-30		Western China	16 months	ChatGPT, Copilot	Web Development	Employed
Lola	Communications	28-32		Eastern China	22 months	ChatGPT, Claude	Full-stack Development	Employed

Note: Age cohorts represent ranges to protect privacy. Eastern China includes Jiangsu-Zhejiang-Fujian coastal areas. Learning duration measured from initial AI tool adoption to interview date. Two participants have overseas experience (Josie, Lola). All participants have bachelor’s degrees, with two holding master’s degrees.

Cognitive Deconstruction: Redefining “Knowing How to Program”

What has “knowing how to program” meant for so long? Writing code from scratch, independently debugging systems, mastering complete technology stacks. As Sweller’s (1988) cognitive load theory points out, working memory limitations are core bottlenecks in learning (Sweller 1988), and this “full-stack independence” capability model is precisely the greatest obstacle for liberal arts background learners—they lack long-term mathematical training and struggle to establish complete technical knowledge systems in short periods.

AI tool intervention changed this definition. As Baobao adopted in practice a completely new division of labor model: “AI uses 10% of my effort to help me generate 70% of code, but the remaining 30% of critical code requires 90% of my effort to understand.” Beyond efficiency improvements, cognitive load achieved redistribution, with AI undertaking memory-based extraneous load (syntax, APIs, templates), while humans focused on understanding-based intrinsic load (concepts, logic, architecture). Among these, understanding complex concepts, analyzing logical relationships, and integrating cross-domain knowledge are precisely core advantages of humanities education. Baobao’s insight hit the nail on the head: “Previously I thought programming was difficult because you had to memorize so much syntax, now I realize what’s truly important is understanding what problems the program needs to solve. This is exactly what we liberal arts students are good at.” When competency evaluation standards shifted from “independently producing code” to “effectively understanding and coordinating technical resources,” liberal arts women’s language precision, logical analysis capabilities, and cross-domain integra-

tive thinking were no longer disadvantages but became core competitive advantages in human-AI collaboration.

Deeper changes occurred in the “demystification” process of technical cognition. Under Weber’s theoretical framework, a core characteristic of modernity is rationalization’s demystification of traditional authority (Weber 1946). Qiandai’s learning experience typically demonstrated this psychological transformation: “Computer language is logically rigorous, learning it brings joy of decrypting, decoding, and solving puzzles in new languages. Previously I felt programming was mysterious, now with ChatGPT, I realize it’s just another language for expressing logic.” By constructing technology as a black box requiring special talent and long-term training, traditional gatekeeping systems maintain their exclusionary boundaries, intensifying into “talent theory” and “technical superiority theory” shaping. When complex code can be generated through natural language, its knowledge power structure faces fundamental impact, with technology transforming from mysterious knowledge monopolized by few to collaborative tools accessible to anyone with logical thinking. Zhang Zhang’s understanding went further: “Code opened my world, it’s a powerful tool, a lever, I can use it to leverage more possibilities.” She understood technology as “leverage” rather than “skill,” this cognitive framework allowing liberal arts women to bypass traditional negative cognitive narratives, returning to code efficacy and cutting into problem-solving cores.

Improvement in technical learning experiences also manifested in feedback mechanisms. Diudiu felt this when using AI for frontend development: “Writing a line of code and immediately seeing page changes, this instant feedback was addictive. The anxiety of traditional learning where you ’write for half a day without knowing if it’s right or

wrong' completely disappeared." Based on behavioral psychology theories, this instant response mechanism enhanced reinforcement effects of learning behaviors by shortening "behavior-result" durations (Skinner 1953), further reconstructing emotional experiences of technical learning. As Qiandai said: "Programming now becomes liberation of thinking, with capabilities surging through continuous exploration." Transforming from repressive "overcoming difficulties" to exploratory "liberating capabilities," this cognitive transformation laid psychological foundations for subsequent deep investment.

Social Reconstruction: From Marginal Voices to Community Recognition

In modern organizations, technical comprehension is not just a tool but a power symbol. Especially for gender-disadvantaged groups, acquiring technical capabilities means fundamental enhancement of discourse power and decision participation rights. Hazel's workplace experience demonstrated this transformation's concrete process: "When I used AI to train models and master technology, my discourse power when telling product stories was completely different from when I only did product work." Transforming from passive recipient of technical decisions to active participant, from operational executor to strategic advisor, identity power achieved structural advancement through technology acquisition.

When AI broke through "non-technical" position transparent ceilings, it also created entirely new value, allowing "soft skills" scarce value to be rediscovered. Maimai's experience in robotics projects was enlightening: "I can explain complex technical concepts to ordinary users, something pure technical background people cannot do. Teams need people who understand user psychology and business logic, this is precisely my strength." When pure code generation was undertaken by AI, human value was more reflected in requirements understanding, creative conception, quality judgment and other cross-domain integration segments—work values previously viewed as insufficiently solid or "capability deficiencies" urgently awaited rediscovery in new rounds of social division patterns.

New learning strategies using AI tools allowed interviewees to enter technical communities with lower cognitive costs. "I answer questions in technical groups and can help others. When someone solves problems because of my answers and expresses thanks, I feel I'm truly a 'technical person.'" While Baobao's experience might seem ordinary to professional practitioners, for women who traditionally faced implicit stereotypes in technical workplace environments, contributions were more objectively valued in technical communities centered on problem-solving. Technical capabilities acquired through AI precisely built realization spaces for marginalized groups' capability demonstration and social recognition.

Identity Reshaping: From Flexible Strategies to Autonomous Persistence

When asked how they presented themselves externally after career transition while also understanding themselves,

we observed interviewees adopting shrewd yet wise identity management. Based on precise grasp of social expectations and personal development rhythms, Baobao's approach was most representative: "I now position myself as 'a psychology major student learning programming,' this lowers others' expectations while giving myself growth space. When I actually get employed, I'll say 'I'm a frontend developer.'" Transforming identity attributes from social labels to strategic resources, users aimed to create optimal social environments for their technical growth.

Simultaneously, some interviewees' choices showed greater thoughtful depth. Among numerous responses, Qiandai persisted in her viewpoint: "After learning programming, I still firmly call myself a liberal arts student. Things like thinking are what give me subjectivity, judgment, thinking, methodology... maximally leveraging my strengths." She redefined cross-boundary combination as unique advantages rather than compromising identity ambiguity. Her wisdom lay in seeing seemingly disadvantageous "non-professional backgrounds," through subjective initiative learning accumulation, allowing people to obtain technology's tool value without succumbing to instrumental rationality, retaining humanities cultivation's insight and reflection space. More importantly, interviewees redefined this cross-boundary combination as unique competitive advantages, indicating potential value spaces for composite characteristics.

After learning technology and reflecting on previously disadvantaged situations, interviewees demonstrated profound social construction consciousness. Almost all interviewees shared their career transition insights freely on Chinese social media platforms (Xiaohongshu, Douban), whether methodological precipitation or cognitive awakening. They recognized their demonstration function as "pioneers," consciously transforming personal experiences into collective resources. Diudiu wrote: "Our generation of women needs to work harder to ensure the next generation of women develops in better, more equal environments." Hazel also wrote: "As long as you can see it, you can do it. Let more liberal arts women realize there exists a controllable, visible future." When disadvantaged subjects remain submerged under systematic concealment, individual career transitions have transcended subjective choices, rising to micro challenges against established social divisions, gender discourse, and technical power. In this identity shaping process, AI tools through redefining technical capabilities not only changed "who can become technical people's" realistic patterns but more importantly shook "what technical people should be like" social imagination, with interviewee groups personally answering related questions through practical actions.

System Breakthrough: Synergistic Effects of Triple Mobility

The key to cognitive deconstruction, social reconstruction, and identity reshaping lies in systematic synergistic effects—mutually reinforcing positive cycles: AI tools redistributed loads at cognitive levels, lowering learning thresholds; capability acquisition promoted technical community

participation, driving social capital accumulation; social status improvement provided external confirmation for identity transformation, incentivizing deeper investment. This positive cycle gradually loosened previously solidified systems, achieving personal choice and identity reconstruction at micro levels while constituting structural challenges to traditional technical elitism and gender division systems at macro levels.

Notably, this mobility opportunity depends on specific historical windows. Positioned in generative AI's diffusion stage from "early adopters" to "early majority" (Rogers 2003), technical thresholds rapidly decreased while social cognition had not fully adjusted, creating "overtaking on curves" historical opportunities for marginalized groups. Zhang Zhang frankly acknowledged: "I feel ChatGPT and others came too timely. If it were a few years earlier, I might never have considered career transition; if a few years later, the opportunity window might have closed." As AI tools become standardized and institutionalized, new thresholds and exclusion mechanisms may reform, making current identity transformation practices not only results of individual choices but also active identification and strategic grasp of historical opportunities. Interviewees' viewpoints also reflected cautious aspects. After answering about "using 10% effort to generate 70% code," Baobao mentioned that while AI lowered entry threshold difficulties, how far one could go still depended on personal technical capabilities and business thinking: "In early practice, solid manual work is still needed, must truly understand ins and outs." Hazel also reviewed: "AI on one hand helped me break through long-term investment thresholds that ordinary people previously faced in using technology well, on the other hand, it activated my curiosity and enthusiasm for programming principles, no longer 'teach you to generate XX in a few sentences' but reminding me of long-term investment, compensating foundational knowledge, understanding technology and creating better."

AI tools provided new possibility structures for marginalized groups, but whether they could be effectively utilized depended on individuals' cognitive frameworks, social networks, and strategic selection capabilities. It is precisely in dynamic interactions between technological possibilities and individual agency that new identity forms and social relationship patterns emerge and stabilize. From empirical perspectives, these recorded career transition experiences provide firsthand witness materials for understanding digital age social division mechanism changes.

Discussion

History never progresses linearly. When AI tools opened doors to the technical world for liberal arts women, a more complex question emerged: Does individual breakthrough necessarily bring structural transformation? This paradox's core lies in breakthrough and co-optation often occurring simultaneously, interweaving. Personal agency's release creates real transformative possibilities, while its realization pathways are full of traps and reversals. Precisely because they experienced solidification's heavy costs, how to measure transformation value and construct sustainable change

strategies became consistent thinking extensions for interviewee groups.

Identity Crystallization: Confirmation Process from Fluid State to New Stable State

Breakthrough begins with questioning. Zhang Zhang's initial career transition motivation was utilitarian—to escape the depressed liberal arts job market. She said: "I'll first achieve worldly success, first stand firm." True transformation occurred when she discovered she could competently handle technical work: "Code either runs or doesn't run." When technical outcomes could be verified by objective standards, prejudices about non-matching professional backgrounds were dissolved. Zhang Zhang began reexamining her value, no longer job seeking with outsider "entreat-ing" attitudes but with more confidence in salary negotiations: "I can do this work, this is what I deserve."

The same logic manifested in Baobao through confrontational means. Facing male interviewers' questioning that "female programmers aren't popular," she didn't defend her background but changed evaluation scales: not "where do you come from" but "how do you define problems, decompose paths, verify solutions." She positioned "thinking methods and logical abilities" as programming's core, equivalent to translating programming from "memorizing syntax" to "organizing knowledge and problem-solving" capability practice, thus transforming originally viewed disadvantageous liberal arts training into visible and verifiable competitive advantages. Precisely through persisting in this thinking pattern, she not only received frontend development offers through 30+ interview experiences but more importantly established external recognition through repeated capability testing. Each successful technical problem answer, each passed programming test, powerfully refuted "liberal arts women cannot program" prejudices.

Real verification from external society became stabilizers for cognitive breakthroughs, transforming questioning into confidence and further shaping self-identity. When Baobao began "answering questions and helping others" in technical groups, this role transformation had symbolic significance: from help-seeker to helper, from knowledge consumer to knowledge contributor. When contributions could be confirmed through objective standards like code operation and problem-solving, technical communities' relatively neutral evaluation mechanisms made such transformations possible, with originally identity disadvantages transforming into unique values, making her feel "I'm truly a 'technical person.'"

Final confirmation manifested in lifestyle reconstruction. Interviewees indicated this experience not only changed "what I know" but more importantly redefined "how I live." Qiandai defined herself as a "restless soul": "Constantly changing residential cities... new environments are new information sources for me." Geographic mobility experiences had existential philosophical meaning; she precisely broke through traditional career track geographic constraints, gaining greater development space and identity freedom. Josie's identity exploration in international environments also reflected similar spatial strategies, not limited by mainland

China's domestic environmental identity constraints (Apadurai 1996). She carefully planned study abroad projects, weighing cost-effectiveness and career paths, actively seeking institutional environments more suitable for personal development. Beginning with skill attempts, interviewees' identity evolution progressed step by step, starting with internal cognitive revolutions, gaining external social verification, ultimately achieving holistic existential reconstruction.

Structural Backlash: Mechanism Perspective on Co-optation

Individual breakthroughs' authenticity doesn't automatically guarantee structural transformation. Quite the contrary, visible successes often become the most effective ideological tools for proving "the system is fair" and "opportunities are equal," specifically manifesting as three-step chains of narrative individualization, role redistribution, and threshold reconstruction, making structural inequality continue existing amid visible progress (Fraser 2013).

Success narrative individualization packaging begins with clever inversion of causal relationships. When "liberal arts women career transition success" stories spread widely, focus quietly shifts from "why does the system exclude" to "how individuals work hard." According to 51job's 2023 survey, among career transition students, males comprised 76% while females only 24%, yet media preferred amplifying minority female success cases, packaging them as "work hard and you can succeed" inspirational stories (?). Even though Baobao proved capabilities through objective achievements, she still encountered direct questioning in interviews: "As a female, you're not popular in the programmer market." This reality-narrative contrast reveals co-optation logic's core: individual success transforms into "equal opportunity" evidence while failures are attributed to insufficient personal effort, thus making structural obstacles invisible.

Since "opportunities are equal," organizations can legitimately implement "limited inclusion" strategies, welcoming diverse talent while maintaining core power homogeneity through functional arrangements. Maimai's corporate experience typified this: "The company welcomes 'composite talent' like me, but more wants to utilize my communication abilities rather than truly recognizing my technical judgment." Organizations superficially embrace diversity while actually achieving boundary management through functional guidance, with technical women systematically directed toward product manager and other "soft positions," technical value redefined as communication tools (Acker 2006). When Baobao interviewed for development positions, she was suggested to be "more suitable as product manager," but she revealed the truth: "Product tracks don't require specific majors, prefer prestigious school soft backgrounds, and even prefer computer science backgrounds... Development positions look downstream in technical discrimination chains but actually have greater demand, lower thresholds, and higher average salaries than most product positions." Professional threshold double standards precisely realized this boundary management's cunning achievement, providing symbolic spaces for diverse

participation while ensuring technical cores weren't "diluted."

The third step is "new threshold" hidden reconstruction: when AI enabled liberal arts women to also write operational code, technical fields didn't truly open but quickly redrew lines. New stratification no longer based on "can you program" but "how to judge AI-generated code quality" and "can you identify model limitations." This transformation's cleverness lies in replacing originally objective technical standards (can code run) with subjective judgment standards (what counts as "good" AI usage) (Zuboff 2019). Yunlan mentioned "true science requires repeated trial and error," originally reasonable scientific attitude but in actual operations transformed into new exclusion tools, with those "overly dependent" on AI deemed lacking "deep understanding" while those who could "correctly" use AI viewed as possessing higher professional competence. Qiandai's observed "technical superiority theory" operated precisely this way—superficially acknowledging AI lowered thresholds while actually maintaining existing hierarchical orders through redefining "professionalism." This mechanism's co-optation effect: liberal arts women could "use" AI tools but struggled to obtain discourse power to "define what constitutes correct usage." They were allowed to execute but excluded from standard-setting, thus re-marginalized in new technical environments.

Limitations and Future Work

Transformation Boundaries: Hidden Screening of Opportunity Distribution

Upon reflection, our ten interviewees' career transition backgrounds also drew our attention. Geographically, seven came from Jiangsu-Zhejiang-Fujian coastal areas and three from central-western regions, but all completed transformations leveraging top university resources or overseas environments. According to the "52nd China Internet Development Statistics Report," eastern region netizens' digital skill levels significantly exceed central-western regions, with urban-rural digital divides remaining obvious (China Internet Network Information Center 2023). Outside China's technical environment, Lola's work experience in the Netherlands reflected "inclusive premiums": "Nobody here questions my technical abilities because of my liberal arts background; everyone focuses more on what problems you can solve." Qiandai's observations confirmed geographic differences' reality: "Different cities' technical atmospheres and gender inclusiveness vary enormously." The problem lies precisely in that when "changing environments" becomes effective strategy for breaking solidification, mobility itself becomes privilege. When coastal region interviewees could "self-fund participation in European training camps" and "explore interests without economic pressure," interviewees from less developed regions faced "tuition requiring installment payments" and "must quickly find employment to repay debts" realistic constraints.

Educational capital's Matthew effects further amplified inequality (Merton 1968). Yunlan through Tsinghua internal resources and Hazel's cognitive frameworks established at

top business schools far exceeded knowledge itself's value. "The school's entrepreneurial atmosphere made learning technology feel natural, with surrounding classmates trying various possibilities." Behind Hazel's relaxed expression lay elite education environments' shaping of individual "possibility boundaries." The "2023 Higher Education Quality Report" shows 985/211 university students' probabilities of obtaining internships and employment opportunities are 3.2 times those of ordinary undergraduates (National Institute of Education Sciences 2023). When "career transition" information circulated within specific alumni networks, educational backgrounds not only determined contact opportunities but provided cognitive frameworks for interpreting and utilizing information.

Economic capital constitutes the most direct threshold. National Bureau of Statistics data shows 2023 urban-rural resident per capita disposable income gaps reached 2.39 times (National Bureau of Statistics of China 2024), with groups from economically backward regions facing not just learning thresholds but survival anxieties. "Every time I wanted full-time study, rent and living expense pressures made me retreat... trial-and-error costs were too high." Another interviewee's psychotherapy experience revealed deeper spiritual costs behind "destiny-defying transformation": "Technical learning pressure plus economic anxiety gave me severe somatization symptoms." Baobao was frank about this: "Without family economic support, I couldn't have had so much time for trial-and-error and learning."

Bourdieu's insights were verified here: different forms of capital can mutually transform, but transformation itself requires capital as prerequisite (Bourdieu 1986). While AI tools lowered technical thresholds, "seizing opportunities" as behavior still required geographic mobility, educational networks, and economic security support. When "personal choice" became mainstream narratives explaining differences, structural inequality in capital allocation was also successfully concealed by success. As one interviewee reflected: "Our success experiences might not help those who need help most, because they face not just technical thresholds but structural difficulties we haven't experienced."

Tension Navigation: Cautious Activism Strategy Construction

When breakthrough and co-optation coexist, transformation strategy keys lie in utilizing rather than dissolving internal contradictions. Practitioners explored "cautious activism" constituting action philosophies for navigating complex realities, with cores lying in simultaneously operating dual logical systems of instrumental rationality and value persistence (Snow and Benford 1988). Qiandai's practice typically demonstrated this dual encoding: technical level fully mastering backend development, enjoying logical pleasures of "deciphering computer languages"; identity level resolutely refusing complete technical definition, repositioning code as "thinking enhancement" rather than "thinking replacement" tools. When technical capability acquisition no longer aimed at proving identity belonging but redefining belonging itself, liberal arts women found third spaces neither marginalized nor assimilated.

Cognitive time difference identification and utilization constituted breakthrough key mechanisms. Hazel perceived traditional teaching still remaining in no-AI modes while real technology already provided convenient tools for career transitioners; Zhang Zhang repackaged technical learning as "personality realization tools," maximally preserving individuality while adapting to social rules. This "adaptive individualism" was essentially cognitive weapons: through redefining "what constitutes successful technical practice," opening value creation spaces amid mainstream evaluation systems' cognitive lags (Beck 2002). Problems' cores weren't technology itself but technology's definitional power.

Individual breakthroughs ultimately pointed toward collective liberation and institutional transformation. Baobao's role transformation from technical group help-seeker to problem-answerer essentially redrew boundaries of "who qualifies to produce technical knowledge." Transformation's cumulativeness manifested in historical consciousness of intergenerational responsibility: Diudiu's "fighting harder for next generation's more equal environments," Yunlan's "letting more PhDs enjoy research happiness," Josie's "AI needs more liberal arts participation in ethics construction." When marginalized groups transformed from "being technically empowered" to "defining technical meaning," transformation leaped from adaptive to creative, indicating fundamental loosening of technical power structures.

"Cautious activism's" transformative philosophy cores lay in dialectical grasping of contradictions: maintaining clear cognition of structural constraints while persisting in historical confidence in agency practice; utilizing strategic wisdom to respond to realistic complexities while maintaining value ideals' long-term guidance (Hall 1996). It provided action frameworks for navigating uncertainties, placing individual choices within historical continuity: each successful identity transformation became cultural cornerstone for reconstructing social imagination, each bias-breaking practice converged into institutional resources for lowering subsequent barriers, making individual breakthroughs transcend "success story" individualized narratives, becoming organic components of social transformation.

Conclusion

From institutional-cognitive-social-structural synergistic perspectives, this paper systematically reveals deep mechanisms by which Chinese liberal arts women were excluded from mainstream technical fields under traditional liberal arts-science streaming systems, and based on new contexts of generative AI tool proliferation, proposes "AI-enabled identity negotiation" models. Research findings: first, historical institutional inertia formed gendered cognitive barriers through preset knowledge divisions; second, AI tools broke solidified closed loops across dimensions including cognitive load restructuring, algorithmic filtering breakthrough, and community participation enhancement; third, individuals utilized "cautious activism" strategies in social reconstruction and identity management, achieving role advancement from technical consumers to technical contributors. Above findings not only enrich theoretical

frameworks of technology sociology and gender research but provide empirical bases for inclusive technology design and educational policy formulation.

Although this research deeply depicted liberal arts women's technical identity reshaping processes through qualitative multi-source data, sample geographic and educational capital distributions have certain limitations. Future research could combine large-scale surveys or experimental designs to test model universality and causal mechanisms (Creswell 2014). Simultaneously, further exploration of new exclusion mechanisms possibly emerging after AI tool standardization and individual agency differences under different regional and cultural backgrounds is necessary. Looking forward, utilizing mixed methods and cross-national comparative research will help reveal digital age social stratification dynamic changes, providing more operational strategic guidance for promoting technical fairness and gender equality.

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