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"Learning Matrix" in Academic Libraries: Miniature FLC Model for Cross-Campus and Dormitory Use Based on Field Theory

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Abstract: In the daily life of university students, libraries, dormitories, and public learning areas often exhibit fragmented and loosely organized learning structures, making it difficult to form a sustainable and stable learning community. This study uses field theory as its analytical framework, proposing the concept of a "learning matrix" and a miniature FLC (Faculty-Library-Community) model. It incorporates cross-campus and dormitory scenarios into the academic library's learning support system to construct a multi-node, interactive, and collaborative learning support network. Through the collaborative operation of librarian-embedded services, cross-campus resource-sharing platforms, and virtual learning communities, this study constructs a three-wheel dynamic system: a "micro-wheel" driven by learners' intrinsic needs, a "meso-wheel" maintained by rules and collaborative relationships, and a "macro-wheel" shaped by university policies and digital platform governance. This system explains the mechanism by which the miniature FLC operates stably and sustainably. In the pilot action study, this research employs semi-structured interviews and focus group discussions to qualitatively analyze the actual participation experiences of students, librarians, and mentors. The results showed that the "learning matrix" significantly enhanced students' learning initiative and academic self-efficacy, reduced academic loneliness, and promoted interdisciplinary communication and peer support. The roles of librarians in academic guidance, resource navigation, and learning atmosphere creation became explicit. The collaborative support relationship between tutors and librarians tended to be stable, forming a flexible support network oriented towards students' learning needs.

1. Introduction

University libraries have long played multiple roles as a center of knowledge and cultural capital, including providing access to information, supporting academic learning, and building learning communities. In light of the digital and intelligent revolution, current library service models face a

number of challenges including increasingly fragmented learning behaviors, spatial fragmentation within the campus library, and the increasingly fragmented use of library resources and physical spaces, given the rise in the frequency of cross-campus learning, dormitory learning, and online learning. Effectively developing new partnerships between multiple venues and supporting the construction and transfer of learning habits has become a new imperative for library academic support models to offer. The emergence of more diverse learning behaviors and increased student agency within learning in tandem with the growing emphasis of interdisciplinarity in research across campuses has heightened expectations of university service models, particularly the traditional, one-way delivery of information based on librarianship. Therefore, new models of academic support that build on the premise of providing information must be considered, while ensuring educational practices and research needs are met in the new era.

In light of this, Bourdieu's field theory offers a theoretical framework for analyzing and maximizing learning support through academic libraries. Field theory foregrounds the reciprocal relationship between "field, habitus, and capital," and serves as an analytical lens for understanding the transactional transfer of learning behaviors and habitus re-organization by learners in multi-space, multi-resourced sites. Using field theory as a foundation, the paper introduces the term "learning matrix" and develops a cross-campus and dormitory micro-FAC (Faculty-Library-Community) framework, bringing together libraries, dormitories, study rooms, and digital spaces in a multipoint connected learning support network. Using librarian-embedded services, minimal tutor support and collaborating with student peer communities - the model facilitates the transfer of learning behaviors, re-organization of habitus, and generation of academic identity, outlining an operating practical pathway for innovation in digital services in university libraries.

2. Related Works

In recent years, with the rapid development of digital and intelligent technologies, digital libraries have played an increasingly prominent role in academic resource acquisition, information services and user experience optimization. A large number of studies have explored the system quality, user trust, artificial intelligence applications and service innovation in the metaverse environment of digital libraries from different perspectives, providing rich empirical and theoretical basis for understanding the functions and potential of digital libraries in the modern academic ecosystem. The following systematically reviews relevant studies to reveal the key relationship between digital library technology applications, user behavior and service optimization. Anser et al. used a cross-sectional design to collect data and conduct empirical analysis on the mediating effect of electronic trust in digital libraries on electronic service quality and electronic loyalty. The results of this study indicate that future digital library users are more loyal to institutions that provide high-quality electronic services [1]. Malakhov et al. created an ontology-based digital library processing system for scientific publications. The system implements information retrieval and knowledge discovery technologies in digital libraries and focuses on using technologies and tools such as semantic web and cognitive graphics [2]. Misra et al. used a cross-sectional survey design and a stratified random sampling method. The results showed that students' willingness to continue using digital library systems was significantly affected by the quality dimension of digital library systems, mediated by user satisfaction [3]. Fredriksson analyzed India’s Traditional Knowledge Digital Library (TKDL) as a potential intervention for patent law management. The conclusion is that, on the one hand, TKDL bridges the gap between the main branches of Indian traditional medicine and the formal knowledge system of the International Patent Classification [4]. Farid et al.’s findings indicated that organizations and users trust libraries due to their strict privacy and data

security policies [5]. Aithal and Aithal's findings: Based on the analysis, comparison and evaluation of ChatGPT with traditional and digital library systems. They found that AI-based GPT has the potential to complement traditional libraries in providing customized information support [6]. Verma pointed out that AI-based data aims to simulate the digital causal relationships embodied by virtual avatars in Web 3.0 and mine the big data level of related concepts in daily life. The introduction of AI-based digital chatbots with data authenticity can significantly improve the concept of digital libraries, namely, continuous and voluntary data sharing and retrieval around the clock (24 hours x 7 days) and various activities through digital search [7]. Lund et al. used Cooper's comprehensive evaluation method to conduct a comprehensive analysis of existing literature on ChatGPT and its potential applications in the library environment. The literature analysis revealed a variety of applications of ChatGPT in medical libraries, including helping users find relevant medical information, answering questions, providing advice and promoting resource access [8]. Tella et al. analyzed various library websites and consultation literature related to the connection between libraries and the metaverse, meta-information literacy and its importance to librarians and users, and the challenges of cultivating meta-information literacy in the metaverse. The results showed that as the metaverse continues to develop, libraries and librarians must adapt and develop the necessary skills to continue to provide valuable resources and services to the community in the virtual environment [9]. The existing operating model of taste libraries has limitations in attracting young readers. To address this issue, Kwan et al. proposed a series of marketing strategies focusing on enhancing their social network influence, providing digital content and conducting campus promotion activities [10]. Jha used a qualitative approach and content analysis techniques to identify emerging technologies in the field of smart libraries. The results showed that artificial intelligence is a dynamic technology that can be applied to library services. The use of artificial intelligence in library operations drives libraries in the right direction [11]. While existing research has extensively explored the system quality, user trust, and artificial intelligence applications of digital libraries, it still faces bottlenecks such as research focusing on single technologies or single user groups, lack of systematic verification of cross-domain collaborative mechanisms, and lack of long-term learning effects.

3. Methods

3.1 Analytical Framework of Field Theory

The field theory proposed by French sociologist Pierre Bourdieu in the 1970s provides an important perspective for understanding the structural relationships and interaction mechanisms in educational situations [12]. The field can be understood as a social space composed of different positions and their interrelationships, in which each actor participates in competition and negotiation according to the capital they possess. "Habituality" is a stable cognition, perception and behavioral tendency that an individual gradually forms in long-term practice. It is both the result of field shaping and has the function of reversely constructing the meaning structure of the field. "Capital" is the key resource for actors to strive for position and influence in the field, including knowledge capital, cultural capital, social capital and technological capital.

In the learning environment constituted by academic libraries, actors such as students, teachers, librarians, and learning communities interact around information resource acquisition, learning strategy selection, and the construction of collaborative relationships. This interaction manifests not only in competition for resources and power but also in the generation and stabilization of learning habits and ways of thinking. As learning activities gradually expand from the single physical library space to cross-campus learning centers, dormitory study spaces, and virtual platforms, the overlap of diverse learning environments constitutes a new learning ecosystem. Therefore, studying the

"learning lattice" based on field theory can reveal the structural connections between different learning spaces and how learners form continuous learning habits through multi-field migration.

3.2 Driving Mechanism of the Miniature FLC (Functional Learning Community)

In engaging inter-campus and inter-dormitory micro-FLC, the role of member engagement and interaction is instrumental in the continuation of the community. Research on student motivation has shifted across time from a traditional behaviorism view of motivation, where the idea of external rewards served as the driving factor of student motivation, to a cognitivism perspective focused on student intrinsic will, to a more of a group dynamic with a focus on group norm and relativity of social interaction. Further research in social psychology has suggested and identified that motivation in individuals is created and sustained not as a result of individual needs but also a continuum of broader patterns of experience, including structural and environmental influences that interrelate with cultural and social expectations.

Consequently, this study has proposed FLCs with motivation as a dynamic mechanism conceptualized as three interacting levels including: at the micro-level: learner autonomy needs and learning behaviors; at the meso-level: community interaction rules and interactional structures to foster collaboration; and finally, at the macro-level: school systems at-scale and across-institution relation strategies and the utilization of digital platforms to scaffold the learning. These interacting levels can initiate, enhance, and sustain knowledge sharing, identity recognition, and stable collaboration to build community in a shared group to foster personal and group learning and contribute to a continuous and interrelated overall system of learning "learning matrix world" across dormitory and campus dynamism.

3.3 Structural Characteristics of Academic Library Learning Environment

(1) Libraries as central venues for the accumulation of knowledge and cultural capital

In the university learning ecosystem, academic libraries are not only centralized repositories of knowledge resources but also crucial venues for constructing cultural capital and academic identity. In the digital context, the role of libraries is shifting from traditional information providers to builders of cross-platform, interdisciplinary knowledge ecosystems. By establishing digital applied research resource platforms and introducing multimodal technologies such as artificial intelligence and virtual reality (VR), libraries enable learners to gain immersive and interactive research experiences. For example, virtual academic lectures, digital exhibitions, and role-playing simulations allow students to engage in "tangible academic participation" within the library, thereby promoting their academic identity and the development of good study habits. Thus, libraries become core venues within the university where learners possess the greatest advantage in converging symbolic, cultural, and resource capital.

(2) Hierarchical network structure of cross-campus learning resources

In a multi-campus educational system, the library and its digital platform constitute a cross-regional resource connectivity network. Differences in subject layout, resource allocation, and faculty strength among different campuses create a hierarchical and functionally differentiated learning resource structure. The library, through its digital sharing platform, subject consultation system, and cross-campus document delivery service, enables the transfer and linkage of resources between different locations within the campus. This cross-campus network not only breaks down physical barriers but also provides a structured path for learners to move across different spaces, transforming learning from a single-space activity into a continuous, cross-node "matrix-like" process, thus laying the foundation for the formation and expansion of a micro-FLC community.

(3) Learning behavior transfer paths between dormitories, study rooms, libraries and online

platforms

As learning activities extend from physical libraries to dormitories, study rooms, and mobile devices, learning environments are becoming increasingly networked and fragmented. Digital research spaces and scenario-based service tools enable students to conduct research, academic collaboration, and learning feedback in virtual environments, overcoming the limitations of time and location. Librarians are shifting from on-site services to remote, supportive support, fostering a cyclical learning path between dormitories, libraries, and online platforms. This multi-scenario learning not only improves the flexibility of resource utilization but also facilitates the diffusion and maintenance of continuous learning habits across multiple spatial nodes.

(4) Process of breaking down, reorganizing and re-solidifying learning habits in multi-field transfer

Generation Z students have highly digitalized lifestyles, but their attention span is easily affected by fragmented information environments, and their learning habits are at risk of breaking down in different settings. During multi-setting migrations, learners' original learning rhythms, focus patterns, and knowledge expression methods can loosen due to spatial changes, leading to a restructuring of learning methods. Through cross-setting micro-FLC communities, continuously interactive digital support platforms, and accompanying learning services, libraries can promote the re-solidification of new learning habits, enabling students to gradually form stable, autonomous, and shared learning behavior patterns. In other words, libraries not only provide resources but also participate in the reconstruction of learning habits.

3.4 “Learning Matrix”: Construction of Miniature FLC Model Across Campuses and Dormitories

(1) Definition of the concept of “learning matrix”: from point-like learning units to network-like interconnected structure

With the improvement of the digitization and intelligentization capabilities of university libraries, learning activities have gradually extended from a single physical setting to a continuous process spanning multiple spaces and nodes. This paper considers several micro-learning communities (FLCs) consisting of dormitories, small study spaces, campus libraries, and online learning platforms as "points," and the connections formed between these points through resource sharing, interactive collaboration, and the transmission of learning habits as "lines." Multiple "points" and "lines" are interconnected to form a "learning lattice" with dynamic fluidity and synergy. In this structure, learning no longer depends on a fixed location, but continuously migrates, links, and reconstructs between different fields, thereby maintaining the continuity, stability, and community attributes of learning habits.

(2) Components of a micro FLC unit

As the basic unit of the "learning matrix", the micro FLC is usually composed of the following three core elements:

1) Actor Role Structure: Student—Teacher—Librarian—Peer Community

Students are the main participants and key drivers of learning activities, and their learning methods and participation patterns directly shape the community structure.

Teachers provide academic guidance and research frameworks, and their knowledge capital plays a leading role in the formation of norms within the community.

Librarians play the role of "knowledge intermediaries" in intelligent retrieval, knowledge organization, platform operation and maintenance, and resource navigation, becoming an implicit support force for cross-domain learning.

Peer communities provide emotional support, collaborative action, and learning incentives for

the community, and are a key source of social energy for the continued existence of micro FLCs.

2) Resource Matrix: Database—Learning Space—Mentor Support—Digital Tools

With the introduction of digital and intelligent technologies, the resource systems upon which micro FLCs rely exhibit highly integrated characteristics, including:

Table 1 Characteristics of the resource system upon which micro FLCs rely

Resource Type	Form of Expression	Supporting Role
Database and Literature Resources	Digital resource platforms, cloud-based literature repositories, thematic databases	Provide knowledge capital
Spatial Resources	Dormitory study corners, library study pods, online virtual study rooms	Construct the learning environment
Mentor Support Resources	Online Q&A, seminar guidance, academic writing tutoring	Provide cultural capital and academic direction
Digital Tools	AI retrieval systems, intelligent recommendation algorithms, AR/VR immersive learning spaces, intelligent Q&A systems	Enhance interaction efficiency and cognitive depth

In particular, the retrieval, question answering, and recommendation systems based on artificial intelligence large language models and cloud computing platforms enable FLC to have adaptive, accurate, and low-threshold participation characteristics, thereby reducing the cost of cross-domain learning and transformation (see Table 1).

3) Interaction Rules: Collaboration—Evaluation—Sharing

Interactions within the micro FLC are maintained through three mechanisms:

Collaboration mechanism: Working together to complete learning tasks or solve problems, forming a group-oriented goal.

Evaluation mechanism: Encourage learners to reflect and learn through academic feedback, peer review, and other methods.

Sharing mechanism: Resources, experience and knowledge flow within the community, maintaining community cohesion.

(3) Generation logic of FLC “lattice” network: an explanation based on field theory

According to Bourdieu's field theory, the formation of a learning lattice is the result of the interaction among three factors: field, habitus, and capital.

Table 2 Formation of the learning lattice

Theoretical Element	Manifestation in the Learning Lattice	Promotive Function
Field	Dormitories, libraries, and online platforms jointly form a multi-centered learning space network	Provides the structural framework
Capital	Academic resources, digital platform literacy, social ties, and learning reputation	Determines one’s position and influence within the FLC
Habitus	Study rhythms, collaboration habits, and cognitive styles gradually formed through movement across spaces	Enables the persistence and internalization of learning behaviors

Learners constantly migrate and interact across different environments. Their learning habits may be disrupted by environmental changes, or they may be reorganized and solidified with the support of digital technology and community collaboration. Micro FLCs stabilize these habits through continuous collaboration and cultural sharing, thereby facilitating the self-extension and reproduction of the lattice structure (see Table 2).

3.5 Operating Mechanism of Miniature FLC: Three-Wheel Power System

As the basic operating unit within the "learning matrix," the micro-FLC is not maintained by a single force, but rather by learners' own motivation, internal community interaction mechanisms, and institutionalized platform governance, forming an operating system composed of three levels of

dynamics: micro, meso, and macro. These three elements mutually influence and check each other, jointly maintaining the stability and sustainable development of the FLC.

(1) Micro-wheel: learner needs and habitual internal drive

In the learning matrix, students are not passive recipients of knowledge, but active actors with goal awareness, emotional investment, and learning style preferences. Learners' academic interests, professional development needs, and pursuit of learning efficiency and convenience constitute the intrinsic driving force for the operation of the micro-FLC.

Supported by digital technologies, personalized learning recommendation systems based on artificial intelligence and big data algorithms can accurately analyze learners' borrowing records, search patterns, and course needs, thereby pushing customized resources and motivating them to continuously participate in the learning community. Simultaneously, the continuous learning path between dormitory, library, and online platform reduces the time and space barriers of traditional centralized learning, helping to form learning habits and embed learning behaviors into daily life, thus generating "habitual intrinsic motivation."

Therefore, the primary driving force of the micro-FLC comes from: learner-driven goals + AI-assisted learning feedback + embedding in daily learning scenarios.

(2) Mesoscopic Wheel: Construction of Community Interaction Rules and Collaborative Relationships

At the core of the mini FLC is a collaborative learning network. This network consists of students, instructors, librarians, and peer communities. The relationships among these actors are maintained through three types of interaction rules:

Table 3 Relationships among actors

Interaction Dimension	Mechanism Description	Typical Implementation
Collaboration	Promotes knowledge co-construction through joint tasks and problem discussions	Cross-campus course groups, book clubs, thematic seminar groups
Evaluation	Deepens knowledge through peer review and mentor feedback	Academic presentations, reading note exchanges, learning progress leaderboards
Sharing	Enhances collective learning efficiency through resource openness and experience transfer	Shared databases, literature sharing sheets, librarian-guided information pathways

In particular, the embedded services of librarians play a key mediating role here: librarians are no longer limited to "resource providers" but have transformed into "learning process coaches" and "learning path guides" to help students optimize search strategies, manage knowledge documents, and use digital tools, thereby promoting the generation of academic productivity within the community, as detailed in Table 3.

(3) Macro-level: School policy, spatial planning and digital platform governance

The emergence and expansion of micro-FLCs cannot be separated from institutional platform guarantees. Universities should guide micro-FLCs in terms of policy and resource allocation to ensure their organization and scalability.

Spatial planning: the library, shared learning spaces, and dormitory common areas are integrated into the same learning scenario system to form a mobile and expandable learning geographic structure.

Digital platform governance: an integrated resource access channel across campuses and scenarios is established through cloud storage, big data user behavior analysis, and a unified identity authentication system.

Curriculum and research policy support: cross-campus course sharing, cross-departmental mentoring, and institutionalized operation of academic communities and student research projects are Promoted.

4. Pilot Study: Construction and Validation of the "Learning Matrix" Micro FLC at the School of Humanities, X University

4.1 Pilot Background and Target Selection

To verify the operability and effectiveness of the "learning lattice" model in real-world learning environments, this study selected the School of Humanities at University X as a pilot institution. Students in the School of Humanities exhibit the following learning characteristics:

Extensive reading volume and frequent literature searches;

The course is intensive in discussion and heavily reliant on the support of the academic community.

Students frequently move between their dormitories and the library for study purposes.

There is a certain foundation for peer learning self-organization.

Therefore, the School of Humanities has a strong "miniature FLC natural growth environment", making it suitable as the first application scenario for the learning dot matrix system.

4.2 Qualitative Feedback

Target audience: Students, librarians, tutors

Content:

Changes in learning motivation (Are you more willing to actively read/search/ask/discuss?)

Changes in academic isolation (Do you feel supported?)

Changes in academic self-efficacy (Are you better able to write, understand, and express yourself?)

This section is used directly to explain the effectiveness of the "micro-wheel-meso-macro-wheel" dynamic system.

Qualitative research findings: Changes in learning motivation, perceived academic support, and academic self-efficacy.

After an eight-week pilot run, this study conducted embedded interviews (n=18) and focus group discussions (3 groups, 21 people in total) with participants in the "Learning Dots" micro FLC, including students, librarians, and tutors. The interview analysis employed thematic analysis, ultimately yielding the following three core findings.

(1) Micro level: Learning motivation shifts from "external driving force" to "intrinsic driving force"

Most students mentioned in the interviews that after participating in the learning matrix, their learning behavior was no longer mainly driven by course tasks, academic pressure, or external requirements that they "had to complete," but instead by their own interests, initiative in thinking, and perception of the meaning of knowledge.

“In the past, I read literature just to complete assignments. Now I actively seek out resources on the same topic and think, ‘Why are others doing this research? Can I approach it from a different angle?’” (Student A)

"Group discussions force you to express your thoughts, and you'll find that you understand more and are more willing to understand." (Student C)

This indicates that the micro-FLC facilitates the reorganization of learning habits from passive reception to active exploration, which is consistent with the logic of "reconstruction of habits in a new field" in field theory.

(2) Meso-level: Academic isolation has significantly decreased, and academic support networks have been stabilized.

In the past, liberal arts students generally experienced the loneliness of writing papers alone and

the lack of people to communicate with during research. The collaborative structure of the micro FLC effectively alleviated this "academic isolation".

"It doesn't feel like I'm struggling alone; there are people to read and discuss with, so I don't feel so lost." (Student F)

Librarian involvement is also seen by students as a "reliable intermediary for academic resources":

"I didn't know where to start before, but now that librarians are helping me find documents, I feel like I'm no longer the kind of person who's shut out from knowledge." (Student H)

The minimal involvement of mentors provides an underlying "authoritative guarantee":

"It wasn't a long lecture, but rather a gentle, subtle reminder that lets us know we're on the right track." (Mentor M)

Therefore, the community interaction rules and collaborative structure at the meso-level have been successfully implemented, and the learning network has transformed from a "loose peer relationship" to a "stable collaborative community".

(3) Macro level: Improved academic self-efficacy and enhanced learning identity

In focus groups, more than two-thirds of the students voluntarily mentioned:

More willing to express opinions

More willing to participate in academic discussions

When writing, focus on having a clear direction rather than simply piling up materials.

I felt like I was doing academic work, not homework.

“I’m starting to realize that I can be a ‘researcher’ too.” (Student L)

This means that students gain symbolic recognition of their "membership in the academic community" within the learning matrix, which is the reproduction of capital (cultural capital + social capital) in the field in the sense of Bourdieu.

5. Conclusions

This paper, based on field theory and taking university academic libraries as the research object, proposes and constructs a micro-FLC model of "learning dot matrix," aiming to integrate libraries, dormitories, and public learning spaces into a multi-node interconnected learning network. The study analyzes the structural characteristics of the learning field in academic libraries from the perspectives of communicators, users, and interdisciplinary service needs. It explores the processes of fragmentation, reorganization, and re-solidification of learning habits during multi-field migration and proposes a three-wheel dynamic system operating mechanism: micro-wheel, meso-wheel, and macro-wheel. In a pilot study in the School of Humanities, qualitative analysis of the experiences of students, librarians, and tutors was conducted using embedded interviews and focus groups. The results show that the learning dot matrix effectively enhances students' learning initiative and academic self-efficacy, alleviates academic isolation, and promotes the transfer of learning behaviors and peer collaboration across campuses and dormitories. The embedded services of librarians and tutors also achieve efficient flow of resources and knowledge, providing a guarantee for the stable operation of the community.

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