

Research on the Influence Mechanism of Undergraduates' Learning Behavior: A Case Study of the “Information Retrieval” Course (Postprint)

Authors: Wang Meng, Chen Ya, Yang Zhigang

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Abstract

[Purpose/Significance] Based on triadic interaction theory, this study examines the relationship between university students' participation in the “Information Retrieval” course in flipped classrooms and individual traits, organizational environment, and classroom design. [Methods/Process] Through reviewing and summarizing relevant research findings, conducting pilot surveys and expert surveys, a measurement scale for student classroom participation behavior was developed. Key variables were extracted using factor analysis methods, and the influence of variables such as individual traits, organizational support, organizational identification, and classroom design on university students' learning ability was explored through structural equation modeling. [Results/Conclusions] The study found that individual traits, organizational identification, and organizational support variables, as antecedent factors, influence each other. Organizational identification and individual traits not only directly affect classroom design but also exert a positive and significant influence on university students' learning behavior through classroom design. This paper argues that measures such as improving the supportive environment, guiding university students' autonomous learning, optimizing classroom design, and strengthening extracurricular practice can promote student learning and enhance university students' information literacy.

Full Text

A Study on the Influence Mechanism of Undergraduates' Learning Behavior—Taking the “Information Retrieval” Course as an Example

Wang Meng¹, Chen Ya², Yang Zhigang¹

¹Institute of Science and Technology Information, Jiangsu University, Zhenjiang

212013

²School of Information Management, Nanjing University, Nanjing 210023**Abstract**

[Purpose/Significance] Based on triadic reciprocal determinism theory, this study examines the relationship among student learning behavior, individual traits, organizational environment, and classroom design in a flipped classroom setting for the “Information Retrieval” course. **[Method/Process]** Through reviewing and summarizing relevant research findings, preliminary surveys, and expert consultations, a measurement scale for student classroom participation behavior was developed. Factor analysis was employed to extract key variables, and structural equation modeling was used to explore how variables such as individual traits, organizational support, organizational identity, and classroom design influence undergraduate learning capabilities. **[Results/Conclusion]** The study reveals that individual traits, organizational identity, and organizational support—acting as antecedent factors—mutually influence one another. Organizational identity and individual traits not only directly affect classroom design but also exert a positive and significant influence on student learning behavior through classroom design. This paper argues that measures such as improving the supportive environment, guiding autonomous learning, optimizing classroom design, and strengthening extracurricular practice can promote student learning and enhance information literacy.

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1. Introduction

The cultivation of innovative talent is crucial for implementing national innovation development strategies and represents a core mission of contemporary universities. Within the competency framework for innovative talent, information literacy constitutes a fundamental capability that fosters lifelong learning, problem-solving, and knowledge innovation—an area receiving global attention. In 1984, 1985, and 1992, China’s Ministry of Education issued three guiding documents on literature retrieval courses, providing policy foundations and normative guidelines for information literacy education centered on literature retrieval. In 2000 and 2015, the Association of College and Research Libraries (ACRL) in the United States successively promulgated the “Information Literacy Competency Standards for Higher Education” and the “Framework for Information Literacy for Higher Education.” Following international developments in information literacy education theory and practice, the Ministry of Education

revised the “Regulations on Libraries in Regular Institutions of Higher Education” in 2015, stipulating that information literacy education constitutes a primary function of university libraries.

In practice, to comprehensively promote student development, learning, and research, “Information Retrieval” courses have further integrated with new pedagogical forms such as flipped classrooms, MOOCs, and SPOCs, generating new teaching achievements. Content analysis of relevant course teaching research literature reveals that these studies tend to focus on classroom and curriculum construction, yet teaching objectives have not adapted to contemporary changes, remaining focused on primary cognitive goals such as knowledge memorization and comprehension. This indicates that while flipped classroom models have been implemented in teaching practice, they have not truly integrated with the educational goal of cultivating innovative talent, and the essential elements of “Information Retrieval” flipped classrooms have not adequately addressed the critical role of learners—the primary subjects of education.

This study attempts to summarize and learn from successful flipped classroom cases and experiences, conducting empirical research on flipped classrooms with undergraduates as the main subjects. Focusing on the internal and external factors influencing student learning in the “Information Retrieval” course, we analyze and discuss the intrinsic connections among these factors, aiming to mobilize student initiative in classroom participation, achieve collective wisdom sharing and individual knowledge evolution, and ultimately enhance undergraduate information literacy.

2. Literature Review

Flipped classrooms have profoundly impacted various teaching activities, with instruction beginning to focus on the learning subject—the learner. Currently, only a few scholars have approached flipped classroom research from the learner’s perspective. Cui Jingjing et al. conducted research on flipped classroom teaching models based on individual, group, and dual cognitive networks from the perspective of learning objects’ social-cognitive networks in secondary school subjects. Zhao Haixia constructed a preliminary framework for strategies promoting deep collaborative knowledge construction in flipped classroom environments. Most research outcomes focus on the design and optimization of flipped classrooms from partial characteristics of learners and external learning environments.

Regarding flipped classroom design based on learner characteristics, Luo Guofeng transformed the literature retrieval course teaching model from “teacher-centered” to “student-centered,” implementing tailored teaching according to undergraduates’ learning characteristics, professional backgrounds, and needs, and employing multiple evaluation methods to ensure teaching quality and promote reform in literature retrieval course educational concepts and teaching models. Fan Xinmin, based on research into mobile learning, flipped

classrooms, and adult learning characteristics, organically integrated teaching objectives, content, activities, methods, and models according to learner characteristics and requirements, demonstrating student initiative, enthusiasm, and creativity as learning process subjects while leveraging teachers' guiding, inspiring, and monitoring roles. Zhao Donghua, drawing on cognitive load theory, argued that flipped classroom design must fully consider students' cognitive patterns and characteristics, proposing designs that engage multiple senses through modality effects, reflect situated learning through variability effects, and improve learning efficiency by adhering to redundancy effects. Chen Xiaohong et al. approached from the perspective of comprehensive student information literacy to promote innovative thinking, achieving notable teaching results.

In flipped classrooms, internal and external factors complement each other, making external factors equally important. Qi Haijing et al., starting from demand analysis of teachers' and students' needs for information platforms, constructed an information-based teaching platform for university information retrieval courses, providing teaching, learning, supervision, communication, and technical support. Xu Bibo and Zou Juanjuan analyzed high-quality course guidance and "course commitment letters," integrating xMOOCs with flipped classroom teaching to combine knowledge transmission and internalization, thereby enhancing learners' internal motivation. Jiang Lili et al. proposed a theoretical framework for university information literacy flipped classroom design involving three elements: technology, process, and environment, while introducing peer instruction concepts into classroom design to enrich practice. Shao Hua et al., by deconstructing the essence of flipped classroom learning based on ubiquitous resource-sharing platforms, constituent elements of the learning process, and supporting conditions, constructed a personalized learning model for flipped classrooms. Zhou Na introduced participatory learning theory, proposing that university libraries establish flipped classrooms or active learning spaces, combining library orientation training, subject embedding, and curriculum design to stimulate active learning.

In summary, education ultimately concerns people. While focusing on classrooms and curricula is appropriate, this should not justify neglecting curriculum optimization and adjustment from the perspective of students as educational subjects. Education must respect and align with human cognitive, thinking, and learning development patterns to truly facilitate learning. Although the aforementioned achievements provide theoretical and practical foundations for further research, overall improvements are still needed in comprehensiveness to explore multiple learner characteristics, and in research depth to strengthen analysis of learners' active participation, collaborative exchange, knowledge construction, and sharing during learning processes, thereby promoting knowledge internalization. This study, using the "Information Retrieval" flipped classroom as an example, posits that undergraduate learning relates to individual and organizational environmental factors that cannot be isolated in research. Additionally, an unignorable factor is that flipped classroom participation differs from

general social participation research, requiring the integration of technological and social attributes and comprehensive consideration of multiple interactive factors related to the classroom.

3. Theoretical Foundation—Triadic Reciprocal Determinism Theory

In the 1980s, Bandura (A. Bandura) recognized the importance of cognitive factors in individual behavior research. Building upon Vygotsky's (L. Vygotsky) social learning theory, he proposed social cognitive theory to validate and explain individual behavior. Bandura conceptualized social cognition as the process through which individuals perceive and judge their own or others' psychological states or behavioral motivations—the foundation of social behavior. The theoretical essence of social cognitive theory is that individual behavior is simultaneously influenced by environmental and individual cognitive factors, with cognitive factors mediating between external stimuli and personal behavior, revealing individuals' behavioral states when facing environmental stimuli. Social cognitive theory primarily comprises triadic reciprocal determinism, self-efficacy theory, and observational learning theory.

In triadic reciprocal determinism theory, individual factors refer to cognitive or other internal characteristics that influence individual perception and action, such as thinking, cognition, self-evaluation, and physiological response capabilities. Environmental factors primarily refer to external elements that affect individual cognition and behavior. Behavior consists of observable social activities manifested through actions and language in social interactions. Triadic reciprocal determinism posits that for agency to function effectively, the interactive relationships among individual factors, environmental factors, and behavior must be fully considered. Within these multifaceted relationships, individuals form their own thoughts and influence social behavior. This description reveals that internal individual factors emphasize perception and action, which are constrained by environments and implicit rules. Whether external environmental factors can function depends on individual behaviors resulting from cognition. Therefore, the triadic reciprocal determinism system forms and functions based on mutual penetration and promotion among individual factors, environmental factors, and behavior.

Triadic reciprocal determinism theory has been applied across various social behavior research domains, including entrepreneurial intention models, mechanisms through which entrepreneurship education influences entrepreneurial intention, perceived behavior regarding employment policies, triadic reciprocal learning, and doctoral student innovation capabilities. This study argues that triadic reciprocal determinism theory is applicable to researching undergraduate learning behavior in flipped classrooms. The theory indicates that when individual factors, environmental factors, and behavior are in harmonious states, positive interactions occur. In the “Information Retrieval” flipped classroom, undergraduate individual factors (e.g., personality, ability), external environ-

mental factors (e.g., school software/hardware support, course resources, course design), and classroom participation influence teaching effectiveness and information literacy cultivation. Moreover, factors in flipped classrooms are not static; the intensity and patterns of interactive relationships among students, external environments, and participation behaviors adjust according to changes in each component. Therefore, this study moves beyond traditional research focusing solely on “Information Retrieval” flipped classroom design, exploring how to enhance learning initiative from the perspective of three elements: individual, learning environment, and learning behavior.

4. Research Hypotheses and Theoretical Model

Based on preliminary literature review and triadic reciprocal determinism theory, this section proposes relevant research hypotheses to establish a theoretical analysis model.

4.1 Hypothesis Development

(1) Individual Factors—Individual Traits, Organizational Identity, and Classroom Design. Individual traits primarily describe specific individual characteristics, represented in this study by individual identity, which encompasses self-understanding and self-actualization. This manifests as rationally viewing and accepting oneself and the external world, experiencing self-worth and social recognition while pursuing goals, thereby consolidating self-confidence and self-esteem without blindly conforming to social or others’ opinions. The normal operation of the flipped classroom model presupposes that students watch videos before class and engage in discussions and deeper learning during class, making the “student-centered” active learning model the objective. However, students differ individually, with significant variations in learning ability affecting their grasp and understanding of knowledge and skills during pre-learning, consequently influencing flipped classroom design effectiveness. Based on this analysis, this study proposes:

H1: Individual traits positively influence classroom design effectiveness.

Organizational identity generally refers to individuals recognizing they belong to specific social groups and acknowledging the emotional and value significance of group membership. Learning groups established in organizational forms facilitate mutual assistance, mutual promotion, and mutual inspiration during pre-learning and classroom teaching, achieving teaching objectives through collaboration and teamwork-centered activities and improving classroom design. Organizational identity emphasizes not only cultivating teamwork skills through group task-oriented models but also the social components of active learning, highlighting how organizational identity stimulates members’ sense of responsibility, honor, and belonging, enabling multidimensional deep interaction based on shared learning and human resources, and driving curriculum design transformation. Based on this analysis, this study proposes:

H2: Organizational identity positively influences classroom design effectiveness.

(2) Environmental Factors—Organizational Support and Classroom Design. Organizational support primarily manifests as platforms, hardware equipment, and other supporting conditions provided by schools for student learning. Through learning platforms and hardware, students can access syllabi, teaching schedules, learning plans, and pre-learning task lists, utilize flipped classroom resources anytime and anywhere (e.g., learning resources, practice resources, experimental resources, extended learning resources, relevant website links), and use computers, networks, and multimedia equipment provided by school computer labs and classrooms, creating favorable external environments for effective blended and personalized learning. Based on this analysis, this study proposes:

H3: Organizational support positively influences classroom design effectiveness.

(3) Environmental Factors—Classroom Design Effectiveness and Learning Behavior. In the context of “Information Retrieval” course participation, classroom design effectiveness is primarily reflected in three aspects:

Teaching Preparation. Flipped classroom teaching demands high standards for teachers to conduct teaching activities according to individual and group learning characteristics. Teachers must clearly arrange pre-class and in-class learning content and materials, facilitate pre-learning, practice, and experiments, help students engage in knowledge acquisition, consolidation, and self-diagnosis, and enhance learning interest and enthusiasm. Simultaneously, teachers must dynamically adjust teaching pace according to subject content, student characteristics, and teaching environments, and select teaching methods based on knowledge types, learner characteristics, and teaching progress to ensure teaching-learning alignment.

Teaching Interaction. Flipped classroom teaching imposes higher requirements than traditional teaching. Flipped classrooms require flexible environments to meet students’ anytime, anywhere learning needs. According to student learning expectations, teachers must meticulously prepare teaching materials, reasonably select content, and employ diverse teaching methods. Teachers must also adjust in-class inquiry and problem-solving presentations based on classroom feedback, accurately understanding and evaluating students’ absorption and comprehension of learning content.

Teaching Effectiveness. M.G. Moore identified “transactional distance” – a psychological or communicative distance—as affecting learning effectiveness, which fluctuates and constantly changes. In flipped classrooms, teachers must narrow the psychological or communicative distance between themselves and students and among students. Y. Chen et al. proposed increasing dialogue opportunities (teacher-student, student-student) through engaging information retrieval course videos and other auxiliary materials, reasonable teaching methods, and active classroom atmospheres. Therefore, teachers must master in-

teraction characteristics and patterns to promote student quality improvement and cognitive structure optimization, thereby enhancing teaching presentation effectiveness.

Flipped classrooms, through systematic pre-class, in-class, and post-class design, enable undergraduates to develop advanced thinking skills (analysis, evaluation, creation) through autonomous learning, interaction, and group thinking, gradually mastering knowledge, exploring problem essence, and achieving knowledge internalization. During extracurricular time, teachers also guide students to apply knowledge in practice, such as participating in information retrieval lectures, skills training, and retrieval competitions, fully leveraging classroom learning advantages to promote practice, expanding learning time-space from classroom and individual to practice and community, and enhancing personal information literacy. Based on this analysis, this study proposes:

H4: Classroom design effectiveness positively influences learning behavior.

4.2 Conceptual Model

Based on the attribute of emphasizing undergraduate participation in the “Information Retrieval” flipped classroom and triadic reciprocal determinism theory, this study establishes a theoretical framework. Influencing factors for “Information Retrieval” course participation are divided into five dimensions: personal traits, organizational identity, organizational support, classroom design, and learning behavior, constructing a conceptual model of undergraduate learning behavior (see Figure 1 [Figure 1: see original paper]). In this model, the classroom context comprises organizational support and classroom design, including support provided by organizations for classrooms and teaching preparation, interaction, and effectiveness. Individual factors primarily reflect undergraduates’ personal traits and organizational identity regarding task groups, while learning behavior refers to participation in information retrieval practice.

5. Research Design

This section validates the proposed theoretical model through variable selection, survey object and process determination, data quality testing, model fitting, and modification.

5.1 Variable Selection

This study developed measurement items for organizational support, organizational identity, individual traits, flipped design, and learning behavior. Scale items primarily referenced existing research literature indicators, modified according to this study’s context to ensure content validity. Measurement items are shown in Table 1 .

5.2 Survey Objects, Process, and Analysis Tools

The survey targeted undergraduates enrolled in a mandatory “Information Retrieval” course at a university in Jiangsu. The university’s flipped classroom process includes: (1) teachers developing and submitting teaching videos to online platforms according to academic calendars for active student learning; (2) teachers assigning learning tasks to groups, reviewing group presentation materials before class, and providing revision suggestions; (3) teachers and students engaging in face-to-face communication and discussion in class, selecting and addressing questions through group cooperation; (4) evaluating knowledge mastery through Q&A and tests to facilitate progression; (5) teachers comprehensively assessing group learning effectiveness, regular performance, and exam scores for final grade determination.

Before implementation, 20 students pilot-tested the questionnaire, with adjustments made to wording, concept explanation, and item design based on feedback. The formal survey was distributed and collected through the “Wenjuanxing” platform from October 16 to December 19, 2017, yielding 463 responses. After eliminating invalid questionnaires (duplicate submissions from same IP, completion time under 120 seconds, excessive “uncertain” responses, uniform answers), 396 valid questionnaires were retained. SPSS 20 was used for reliability and validity analysis, and AMOS 22 tested model integrity and element relationships.

5.3 Descriptive Statistics

Sample data included teaching preparation, interaction, and presentation; organizational identity, support, and individual traits; and learning behavior, measured on a 7-point Likert scale. The gender ratio was 46:54. Family background: large/medium cities 31.1%, county-level cities 16.4%, rural areas 51.5%. Majors: social sciences 20.2%, science/engineering 47.5%, medicine 32.3%. Grade levels: freshman 29%, sophomore 23.2%, junior 24%, senior 23.8%. Group sizes: under 5 members 16.7%, 6 members 14.6%, 7 members 18.2%, 8 members 31.3%, over 9 members 19.2%.

5.4 Data Quality Testing

Following Anderson and Gerbing’s two-step approach, confirmatory factor analysis (CFA) was first conducted in AMOS 22 to test measurement model reliability and validity.

(1) Reliability. Reliability reflects internal consistency and stability, typically assessed using composite reliability (CR). Higher CR coefficients indicate greater reliability and smaller measurement error. CR values above 0.6 are generally acceptable; this study’s CR values all exceeded 0.8 (see Table 2).

(2) Validity. Validity refers to measurement effectiveness—whether results accurately reflect measured objects. Higher validity indicates better representation of target characteristics. Content validity was ensured through pilot

surveys and expert interviews. Construct validity (including convergent and discriminant validity) measures the degree to which scales capture latent variables. Convergent validity requires that items measuring the same variable load on that variable with significant correlations. For convergent validity, average variance extracted (AVE) should exceed 0.5; this study's AVE values all surpassed 0.6 (see Table 2). Discriminant validity requires that latent variables are distinct without excessive overlap, typically verified when each variable's AVE square root exceeds its correlations with other variables. Table 3 shows satisfactory discriminant validity.

5.5 Model Explanatory Power and Fit Validation

Data were imported into AMOS 22, with MI modification yielding the final model shown in Figure 2 [Figure 2: see original paper]. The model comprises 5 latent variables and 18 observed variables. The model's explanatory power is satisfactory, with R^2 values of 0.76 for classroom design and 0.85 for learning behavior. Overall model fit is good: $\chi^2/df = 2.839 < 3$, GFI = 0.911, RMSEA = 0.068 < 0.080, CFI = 0.967 > 0.90 (see Table 4).

5.6 Hypothesis Testing Results

The model confirms that organizational identity and individual traits significantly affect classroom design both directly and indirectly, positively influencing learning behavior. All four hypotheses are supported (see Table 5).

6. Conclusion and Discussion

This study uses "Information Retrieval" flipped classroom survey data to examine how individual traits, organizational support, organizational identity, and classroom design influence learning capabilities. The model demonstrates that organizational identity and individual traits directly affect classroom design and positively influence learning behavior through classroom design. Antecedent factors—individual traits, organizational identity, and organizational support—mutually influence each other. Path analysis shows high contributions from observed variables to each factor (maximum coefficient = 0.95) and strong correlations among latent variables. Organizational identity, support, and individual traits contribute 0.76 to classroom design variables, ultimately explaining 85% of learning behavior variance. This indicates that more adequate organizational support for information retrieval flipped classrooms, combined with more positive student personalities, better facilitates learner integration into classroom design, thereby promoting learning capabilities.

Based on these findings, this study recommends improving the supportive environment, promoting autonomous learning, optimizing classroom design, and strengthening extracurricular practice to enhance learning capabilities and information literacy.

6.1 Supportive Environment—Material Guarantee for Effective Flipped Classroom Implementation

Flipped classrooms emphasize extracurricular knowledge acquisition, requiring robust learning support environments for hardware resources and network information technology. This study shows high agreement ratings: 5.95 for internet access importance, 6.02 for mobile/computer device importance, and 6.09 for information skills importance, with organizational support rated at 5.46. Basic information technology capabilities are essential for learners to operate network teaching platforms and use multimedia resources, becoming necessary skills for autonomous learning in flipped classrooms. Learning resources also require platform support, which is no longer optional but an indispensable tool in flipped teaching.

How should universities build this environment? First, policy support: Ministry of Education documents like the 2015 “Regulations on Libraries in Regular Institutions of Higher Education” provide impetus. Libraries and course-offering units should secure institutional recognition and policy support for basic information literacy education. Teachers should advocate for information retrieval’s importance in enhancing basic literacy to gain support from faculty and students. Second, libraries should collaborate with other departments to upgrade networks and library systems and build course service websites to meet undergraduate and graduate needs for elective or mandatory information retrieval courses. Third, course-offering units must prioritize digital resource collection, integration, and standardization, with timely textbook updates aligned with information literacy education realities, potentially through unified textbooks or guiding materials compiled by the Ministry of Education’s University Library Steering Committee.

6.2 Autonomous and Collaborative Learning—Enhancing Creativity and Thinking

Flipped classrooms enable learners to conduct autonomous inquiry outside class, developing innovation, cooperation, independence, and creativity through problem-solving. Pre-class video watching, reference reading, online information searching, exercise completion, and problem diagnosis require strong basic information literacy and autonomous learning capabilities. This study shows student self-capability agreement at 5.67. Only with basic information literacy can students communicate with teachers and peers on teaching platforms; only with autonomous learning capabilities can they learn from videos and materials and independently discover and explore problems.

How to cultivate basic information capabilities? First, establish a basic information literacy cultivation curriculum system. Libraries should not work in isolation but collaborate with academic affairs offices, educational technology centers, and network centers to improve supporting courses like “University Computer Fundamentals” and technical services. Second, libraries should inte-

grate freshman orientation, database application lectures, and collection usage training to consciously enhance digital resource usage capabilities.

Flipped classroom tasks require group collaboration and mutual assistance. Teams are relatively new to undergraduates, requiring teacher guidance combining formal and informal resources, classroom and extracurricular instruction, and professional learning with practical education to develop team information application capabilities through knowledge learning, hands-on practice, and competition training. The organizational identity rating of 6.06 demonstrates teamwork's importance. Cooperative learning group-based flipped classrooms generate strong belonging, stimulating self-esteem based on shared and individual learning goals, allowing students to experience team success and gain deeper understanding of knowledge acquisition, sharing, and skills. For students with weaker autonomous learning capabilities, group collaboration and task division constraints can promote social skills, accelerate knowledge comprehension and application, and foster critical and higher-order thinking.

6.3 Classroom Design—Improving Teaching Efficiency and Effectiveness

As an important component of information literacy education, “Information Retrieval” education has diversified, evolving from blackboard to network teaching, from spoon-feeding to self-service, and from face-to-face to blended online-offline instruction. With increasing demands for undergraduate information literacy, teaching quality has gained importance. Libraries and course-offering units need to clarify relationships among librarians, information management faculty, subject faculty, and departmental librarians to resolve staffing issues and ensure education standards. Universities should: (1) enrich instructors' disciplinary backgrounds, preferably selecting teachers with library science knowledge, subject expertise, and strong computer skills; (2) systematically strengthen instructor training to enhance information technology application and retrieval education capabilities; (3) invite database developers to conduct lectures or training; (4) research and learn from international experiences like U.S. information literacy education practices to improve current standards.

“Information Retrieval” instructors should improve teaching environments, design activities, and continuously adjust content and methods based on student conditions, tracking learning effectiveness. Appropriate questions bridge students' existing knowledge with new content from teaching videos. Questions should be designed according to ability levels—challenging materials for high-achieving students and multi-level scaffolding for lower-achieving students. Through inquiry-based and discussion-based teaching, teachers can stimulate brainstorming, encouraging multi-angle thinking and spontaneous problem-solving exploration to cultivate introspective and critical thinking. To promote effective individual and team learning interactions, diversified and multi-stage assessments can ensure learning outcomes, such as evaluating true understanding and knowledge connections during presentations, and

integrating course grades with group and individual performance based on unit tasks, skill demonstrations, and comprehensive operations to motivate group members.

6.4 Practice Internalization—Enhancing In-Class and Extracurricular Learning Utility

“Information Retrieval” education should integrate with university and social informatization, embedding multi-stage and multi-level instruction throughout undergraduate cultivation. Given flipped classrooms’ enablement of free, fragmented, and personalized extracurricular learning, teachers should expand from the “small classroom inside class” to the “large classroom outside class,” enriching classroom forms and guiding extracurricular autonomous learning to improve practical application of retrieval skills. How can flipped classrooms promote learning and enhance information retrieval application capabilities through extracurricular practice, achieving social construction of knowledge and abilities? First, through university-enterprise cooperation, such as database developers providing platforms for “information retrieval competitions” and achievement showcases. Second, through teacher guidance applying retrieval skills to “undergraduate social practice,” “student innovation projects,” and “thesis design,” maintaining self-analysis, reflection, and improvement of information awareness to enhance creativity and thinking, accelerating knowledge transfer and application, and completing practical internalization.

7. Conclusion

Based on Bandura’ s triadic reciprocal determinism theory, this study examined relationships among undergraduate participation in “Information Retrieval” flipped classrooms, organizational environments, and individual traits. The findings indicate that individual traits, organizational identity, and organizational support mutually influence one another as antecedent factors. Organizational identity and individual traits directly affect classroom design and positively influence learning behavior through classroom design. The study demonstrates that information literacy education content, forms, conditions, assessment, and implementation constitute a rational and necessary system. The findings provide reference for universities to implement targeted measures improving organizational support, strengthening individual collaboration, organizing classroom design, and promoting skill application practice, ultimately enhancing learning capabilities and information literacy.

References

- [1] Cui Jingjing, Ma Ning, Yu Shengquan. Research on flipped classroom teaching model based on social cognitive networks[J]. *Modern Educational Technology*, 2016(11): 54-58.
- [2] Zhao Haixia. Research on strategies for deep collaborative knowledge

- construction in flipped classroom environments[J]. Distance Education Journal, 2015(3): 11-17.
- [3] Luo Guofeng. Construction and practice of SPOC blended teaching model for literature retrieval courses[J]. Library Forum, 2016, 36(4): 72-78.
- [4] Fan Xinmin. Research on innovative training model integrating mobile learning with “three stages and nine combinations” [J]. Adult Education, 2017, 37(9): 41-45.
- [5] Zhao Donghua. Cognitive load theory and its implications for flipped classroom design[J]. China Adult Education, 2016(19): 94-96.
- [6] Chen Xiaohong, Gao Fan, He Xuemei. Construction and practice of information literacy teaching model integrating MOOC and flipped classroom advantages[J]. Library and Information Service, 2016, 60(6): 32-37.
- [7] Qi Haijing, Liu Xiang. Research on information-based teaching platform construction for university information retrieval courses under “Internet+” background[J]. Information Science, 2017, 35(8): 108-112.
- [8] Xu Bibo, Li Tian, Shi Xi. Analysis of learning motivation in MOOC, flipped classroom, and SPOC and educational implications[J]. China Educational Technology, 2017(9): 47-52, 61.
- [9] Zou Juanjuan. New teaching model in big data era: complementary integration of knowledge transmission and internalization[J]. Jiangxi Social Sciences, 2017, 37(4): 250-256.
- [10] Jiang Lili, Chen Youhua. Research on university information literacy education design based on flipped classroom[J]. Library Journal, 2015, 34(12): 23-28, 76.
- [11] Shao Hua, Yu Huiqun. Research on personalized learning model for flipped classroom learners based on ubiquitous learning resource-sharing platforms[J]. Education Review, 2015(7): 88-92.
- [12] Zhou Na. Research on university library service design from participatory learning perspective[J]. Library Development, 2016(1): 81-86.
- [13] Franqueira V N L, Tunnicliffe P. To flip or not to flip: a critical interpretive synthesis of flipped teaching[M]//Smart education and smart learning. Berlin: Springer International Publishing, 2015: 57-67.
- [14] Bandura A. Self-efficacy: toward a unifying theory of behavioral change[J]. Psychological Review, 1977, 84(2): 191-215.
- [15] Bandura A. Social foundations of thought and action: a social cognitive theory[M]. Englewood: Prentice Hall, 1986: 169-171.
- [16] Bird B. Implementing entrepreneurial ideas: the case for intention[J]. Academy of Management Review, 1988, 13(3): 442-453.
- [17] Li Jingwei. Research on the mechanism of entrepreneurship education’ s effect on entrepreneurial intention[D]. Tianjin: Nankai University, 2013.
- [18] Jiang Cheng, Li Xiaoqiu. Policy perception and university graduate grassroots employment—based on triadic reciprocal determinism theory[J]. Peking University Education Review, 2015, 13(2): 47-56, 188-189.
- [19] Liu Dajun, Huang Fuquan. Triadic reciprocal learning from knowledge creation perspective[J]. Modern Distance Education Research, 2015(4): 24-32.
- [20] Jin Lingzhi, Wang Xiaomin. Doctoral student innovation capability culti-

- vation based on triadic reciprocal determinism[J]. Higher Education Research, 2011, 32(4): 49-53.
- [21] Ning Depeng. Research on the influence mechanism of entrepreneurship education on entrepreneurial behavior[D]. Changchun: Jilin University, 2017.
- [22] Bandura A. The self system in reciprocal determinism[J]. American Psychologist, 1978, 33(4): 344-358.
- [23] Tajfel H. Social psychology of intergroup relations[J]. Annual Review of Psychology, 1982, 33: 1-39.
- [24] Cui Jingjing, Ma Ning, Yu Shengquan. Flipped classroom teaching model based on social cognitive networks[J]. Modern Educational Technology, 2016, 26(11): 54-59.
- [25] He Lifang. Flipped classroom teaching model and empirical research in information literacy education[J]. Library and Information Service, 2018, 62(17): 53-59.
- [26] Moore M G. Handbook of distance education[M]. London: Routledge, 2007: 417-424.
- [27] Chen Y, Wang Y, Chen N S. Is FLIP enough? Or should we use the flipped model instead?[J]. Computers & Education, 2014, 79: 16-27.
- [28] Ding Yonggang, Jin Mengtian, Zhang Xin, et al. Design and implementation of flipped classroom 2.0 teaching model based on SPOC[J]. China Educational Technology, 2017(6): 95-101.
- [29] Ashforth B E, Mael F. Social identity theory and the organization[J]. Academy of Management Review, 1989, 14(1): 20-39.
- [30] Dukerich J M, Golden B R, Shortell S M. Beauty is in the eye of the beholder: the impact of organizational identification, identity, and image on physicians' cooperative behaviors[J]. Administrative Science Quarterly, 2002, 47(3): 507-533.
- [31] Stets J E, Burke P J. Identity theory and social identity theory[J]. Social Psychology Quarterly, 2000, 63(3): 224-237.
- [32] Polzer J T. How subgroup interests and reputations moderate the effect of organizational identification on cooperation[J]. Journal of Management, 2004, 30(1): 71-96.
- [33] Witt L A, Kacmar K M, Carlson D S, et al. Interactive effects of personality and organizational politics on contextual performance[J]. Journal of Organizational Behavior, 2002, 23(8): 911-926.
- [34] Eisenberger R, Armeli S, Rexwinkel B, et al. Reciprocation of perceived organizational support[J]. Journal of Applied Psychology, 2001, 86(1): 42-51.
- [35] Chow W S, Chan L S. Social network and shared goals in organizational knowledge sharing[J]. Information & Management, 2008, 45(7): 458-465.
- [36] Amabile T M. The social psychology of creativity: a componential conceptualization[J]. Journal of Personality and Social Psychology, 1983, 45(2): 357-376.
- [37] Kratzer J, Leenders R T A J, Van Engelen J M L. Informal contacts and performance in innovation teams[J]. International Journal of Manpower, 2005, 26(6): 513-528.
- [38] Wu C C, Lee G C. Use of BBS to facilitate a teaching practicum course[J].

- Computers & Education, 1999, 32(3): 239-247.
- [39] Chen Ran. Exploring motivations for posting in social livelihood network forums—empirical study of five major Chinese online communities[J]. Xinjiang Social Sciences, 2012(6): 108-114, 164.
- [40] Zhang Shuwei, Wang Erping, Zhou Jie. Motivational mechanisms of collective behavior across contexts[J]. Acta Psychologica Sinica, 2012, 44(4): 524-545.
- [41] Anderson J C, Gerbing D W. Structural equation modeling in practice: a review and recommended two-step approach[J]. Psychological Bulletin, 1988, 103(3): 411-423.
- [42] Ma Xiulin. Flipped classroom teaching model should be student-centered[N]. Chinese Social Sciences Today, 2014-10-20(B02).
- [43] Roehl A, Reddy S L, Shannon G J. The flipped classroom: an opportunity to engage millennial students through active learning[J]. Journal of Family and Consumer Sciences, 2013, 105(2): 44-49.
- [44] Strayer J F. How learning in an inverted classroom influences cooperation, innovation and task orientation[J]. Learning Environments Research, 2012, 15(2): 171-193.
- [45] Yang Bin, Wang Yining, Ren Jiansi, et al. Analysis of blended flipped classroom in American university IPSP courses[J]. China Educational Technology, 2015(2): 118-122, 128.
- [46] Yan Wenfa, Bao Lei, Li Yanhua. Theoretical and practical analysis of foreign flipped classroom teaching models[J]. E-education Research, 2016, 37(11): 120-128.
- [47] Liu Gang. Research on “flipped classroom + cooperative learning” teaching methods in application-oriented university professional courses[J]. Chinese Vocational and Technical Education, 2017(17): 50-53.
- [48] Hua Ming. Research on task-oriented multi-interactive flipped classroom teaching organization[J]. Vocational Education Forum, 2017(17): 68-73.

Author Contributions

Wang Meng: Responsible for data processing, writing, and revising the paper.

Chen Ya: Assisted in topic selection and guided paper writing.

Yang Zhigang: Guided questionnaire development and distribution, and revised paper content.

Note: Figure translations are in progress. See original paper for figures.

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