

The Undergraduate Quality Education in the Era of Higher Education Popularization

Meng Tian, Hui Liu, and Shanshan Gao

School of Computer Science and Technology, Shandong University of Finance and Economics, Ji'nan, China

Email: Tiantian1630@sina.com, liuh_lh@126.com, gss@aliyun.com

Abstract—In the era of popularization of higher education in the United States, undergraduate education at the Small Arts Institute is a quality education, and its talent cultivation model is unique. Adhere to the student-centered liberal arts education concept and establish the training goal of facing the future, laying a solid foundation, and living a life. Teaching is student-centered, designed to help students how to learn and to think. Professional settings and curriculum design respect the students' individual development needs and provide multiple choices for students. The teaching process emphasizes students' participation and integration, emphasizing basic ability training such as writing. Students develop a sense of social responsibility for a variety of programs, extra-curricular activities, internships, and learning in service. Give the power of the school to set up a positive educational environment and community atmosphere full of supportive. The teacher-centered recruitment system, teacher evaluation system, and teacher support system plays an important role in maintaining the tradition and characteristics of the liberal arts college. These ideas and practical experience provide reference for advancing the connotative development of higher education in China.

Index Terms—liberal arts education, undergraduate education, talents cultivation model

I. INTRODUCTION

In the process of popularization and diversification of higher education in the United States, the liberal arts education philosophy and undergraduate education practice of the selective liberal arts college has been highly recognized. Based on the anthropological investigation of the undergraduate education in Macalester College, this paper analyzes the characteristics of the talent cultivation model of the American Institute of Fine English Science and Technology, hoping to draw lessons from the current reform of the undergraduate talent training model in China.

II. EDUCATION CONCEPT: CONTEMPORARY LIBERAL ARTS EDUCATION

Persisting in liberal arts education is an essential feature in liberal arts college. The liberal arts education has distinct connotations in different historical periods,

different countries, and different types of colleges and universities, and has different practical forms and implementation paths [1]. Different from the previous concept analysis, based on the field study of the Liberal Arts College, following linguistic rules of “semantics=words+contexts”, starting from the practice of “Liberal Education” and its internal logic. The liberal arts education of the Contemporary Liberal Arts College can be defined as: a quality education with a long tradition of history, with the goal of cultivating talents with intellectual, social, and leadership skills, and professional settings that combine both unity and diversity. Course planning, course teaching, and accommodation life is supported by a series of teaching-centered teacher management systems, student-centered teaching management systems, and school governance systems that are led by professors. Create a positive, supportive and cohesive community atmosphere on campus to promote students' participation and integration in various formal and informal education activities to promote student growth and development. As an educational Philosophy of liberal arts college in the United States, liberal arts education runs through training objectives and teaching concepts [2].

A. Talent Training Objectives: To Face the Future, Lay a Solid Foundation, and Learn to Live

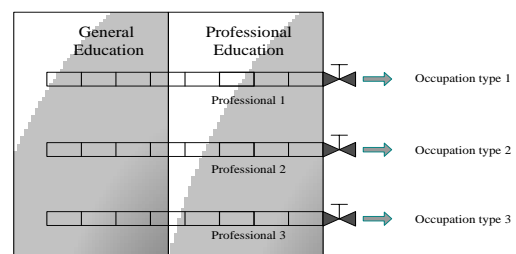


Figure 1. Traditional university model with professional organization.

Personalize training requires universities to take the path of differentiated development. The development model of “student-centered” provides a collaborative basis of numerous changes in the university's organizational structure, management model, and academic atmosphere. In order to adapt to students' flexible need in terms of time, content, and methods, the organizational form and governance structure of the Liberal arts college undergo a fundamental change. Compared with traditional university models (as shown in

Fig. 1), the "student-centered" adaptive growth system aims to enable students to adapt to the various teaching centers (as shown in Fig. 2).

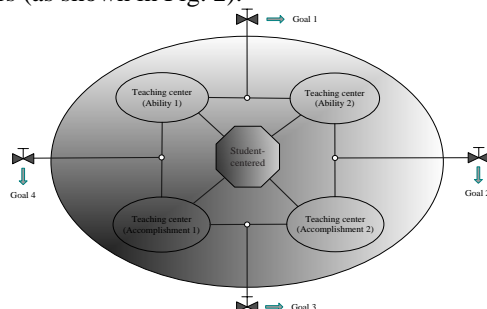


Figure 2. The "student-centered" adaptive growth model.

Liberal arts college is devoted to the cultivation of undergraduate talents and is committed to laying a solid foundation for students' lifelong learning. It emphasizes that students should learn to live, not just to make a living. Let us to look at the mission statement and educational practice of various liberal arts colleges and the concept of talent cultivation. Specifically, firstly, at the knowledge level, Liberal arts college hopes that students can have a broad understanding of the natural sciences, social sciences, and humanities, and learns about the basic theories and basic methods of specific disciplines through course study. At the same time, he learned to use theory to solve problems with a wider range of societies and to apply what he learned. Secondly, at the competency level, Liberal arts college hopes to cultivate students' ability to use information resources effectively, be good at critical, analytical and logical thinking, and be good at expressing themselves in spoke or written form. Thirdly, at the level of attitudes and values, Liberal arts college hopes that students will learn how to take responsibility for their own choices. They hope that students will learn how to make mature judgments and explanations about the world around them and become responsible citizens. These talents are training objectives penetrates into all aspects of school education activities. The Liberal arts college believes that these are the basic knowledge, basic capabilities and basic tools that must be mastered in the face of changing societies and lives. Pomona College hopes to cultivate students to think critically and express clearly. Use various substantive skills to identify opportunities and solve problems; understand society and history; be ethical and responsible for their actions; embrace life creatively and live happily [3]. Kenyon College's training objectives reflect the spirit of liberal arts. That is "cultivating a lawyer with musical taste and hobby history, an architect who reads poetry and is fascinated by archeology, a scientist who can write persuasive, clear and understandable research reports and a businessman who is obsessed with foreign culture and language"[4].

B. The Teacher's Teaching Philosophy: Help Students Learn to Learn, Learn to Think

The Liberal Arts College focuses on undergraduate teaching. It pays special attention to teachers' education

and teaching concepts. When recruiting teachers, they will ask applicants to state their teaching concepts. In the tenure evaluation, teachers are also required to provide materials to demonstrate teaching philosophy, teaching ability and teaching effectiveness.

The Liberal Arts College promotes the concept of lifelong learning, which is also reflected on the teaching concept of teachers. Carlton College is committed to "make students ready to lead their own future study life." The mission of McAllister College [5] is to lay the foundation for students to continue to develop through learning and services". Professor E of the Department of Psychology of the school believes that the mission of undergraduate education is to cultivate people who are good at thinking. His teaching philosophy is to help students learn to think, and to help students succeed. Professor G of the Department of Anthropology believes that the purpose of liberal arts education is to enable students to develop in an all-round way and to broaden their minds through exposure to a variety of different fields, and to lay a solid foundation so that they can respond flexibly to the changing circumstances in the future. Professor R of the Department of History believes that liberal arts education is to help students become students, help students learn to study, master learning methods, and still learn after graduation, and can become useful citizens, good neighbors, and good leaders. In order to help students systematically understand his teaching philosophy, Prof. G in the Department of Geology usually sends a "learning to learn" paper to his students at the beginning of the semester. The mission of a liberal arts college and the goal of personnel training is complementary to the teacher's educational philosophy [6].

The letter written by an alumnus from Williams College is very representative. "In four years, my education in my mater has benefited me the most is to learn 'how to think'. Learn to accept new ideas and thoughts, critically view various social opinions, have my own thinking and reasoning, do not follow the trend, learn to pay attention to the importance of details, and always maintain a curiosity and desire for knowledge." It is also because The Liberal arts college generally attaches importance to train students to think and emphasizes a good foundation. Many graduates of schools of research universities favor graduates of the liberal arts college [7].

III. PROFESSIONAL SETTINGS AND CURRICULUM SYSTEM: FLEXIBILITY AND DIVERSITY UNDER THE UNIFIED FRAMEWORK

The specialized subject and curriculum system of the liberal arts college has the characteristics of diversity and flexibility under the provisions and guarantees of the credit system, reflecting the respect of students' personality and subjectivity, so that different students can choose different majors and study programs, learning content and learning methods, they can develop independently. The Liberal arts college subverts the dominance of schools and disciplines. It focuses on students' abilities and expertise to restructure the

campus's organizational structure and teaching units to adapt to individual education. As the Fig. 3 shows, in a traditional university, students complete tasks one by one according to the requirements of the subject; in the liberal arts college, the school's "ability training center" will accurately connect with students' "skills needs."

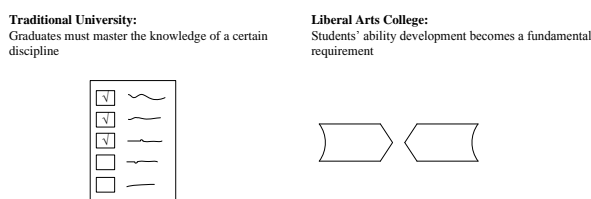


Figure 3. The conceptual illustration of Axis rollover.

A. Allow Students to Design their Own Professional

The Liberal arts college generally allows students with special learning goals to design their own major (individualized interdisciplinary specialty). In general, they have a relatively mature faculty, interdisciplinary major, field of study, or major direction for students to choose. If the above types of professional cannot meet the students' interests or needs, students can also apply for an independent design professional in accordance with certain procedures. For example, at McAlester College, students who choose to design for their own major must submit a curriculum study plan to the school's education policy and governance committee before the registration in the last semester of junior year. Explaining the existing departmental specialty, and the curriculum combination cannot meet or achieve its learning objectives. The plan includes the following contents: The first is the course list, the order of study, and the reasons for completing the individualized cross-curricular majors; the second is the letter of support from the three teachers of the self-designed professional committee. The members of the committee must be from the establishment of the course mentioned in the plan. The teacher who wrote the recommendation must have taught the student. The third is written reasons, students should describe the focus and internal relevance of all courses included in the autonomous design profession, and indicate how did this learning plan meet their specific learning objectives. The committee meets with the students at least once every semester to discuss the progress of IDIM. Owing to the complexity of the application process and the high demands on students, only a few students will choose to design their own professional each year. However, this system fully considers the needs of students' individual development and provides students with more choices. It is a reflection of the school's respect for students' subjectivity and the concept of the "student-centered".

B. Different Options under the Unified Curriculum System

The reason why undergraduate teaching is important is that it gives students a more complete knowledge structure and necessary professional training. Liberal arts college places great emphasis on the integrity and internal consistency of university education. Through four years

of study, students can master a reasonable structure of subject knowledge, take into account the breadth and depth of knowledge, and experience specific educational experience at different stages of education. The students of the liberal arts college generally have a joint experience of freshman seminars, sophomore decision-making, junior extracurricular studies, and senior comprehensive training course. In this process, each student has multiple choices. For example, there are several themes for students to choose from the compulsory first-year freshman seminars for first-year college students, but the purpose of the course is to help students integrate into the school and have a sense of belonging to the school, and through frequent writing training, students can achieve the level of writing at the university level. At the end of the next semester, sophomores will determine major courses, and will ensure that students can extensively cover different disciplines before they can determine their majors, so that they will not narrow their horizons. At the same time, the school's restrictions and regulations on major course credits are also designed to ensure that students do not put too much effort into a certain area. The junior out-of-school study aims to enable students to understand the language and culture of different countries by immersing themselves in different cultural atmospheres, and to have a new understanding of their country's culture and themselves. The senior comprehensive training course is designed to help students integrate and comprehensively use the knowledge and abilities they have learned in the past four years to achieve the integration of disciplines, knowledge, and abilities to form a holistic thinking. This experience is gradually completed through systematic training as the guidance of instructors and instructors through small class teaching and advanced seminars. Finally, students can achieve peak experiences in various forms of activities such as public reports or public performances, thus ending their own university life. This institutionalized and well-designed curriculum framework system meets the needs of students at different stages. Each student has a complete university experience. At the same time, each student has a personalized and unique education experience.

IV. TEACHING PROCESS: EMPHASIS ON STUDENT PARTICIPATION AND INTEGRATION, ESPECIALLY THE BASIC ABILITY TRAINING SUCH AS WRITING

The mission of the university should be to make everyone become an explorer and learner. The teaching task of the university is to let every student to participate in this common mission -- exploration, research and discovery. Students should be active participants, not negative recipients. The liberal arts college in American has paid special attention to the participation and integration of students [8]. The most obvious manifestation is the large number of students in the classroom to participate in exchanges and discussions. After the class, students are assigned a large number of reading and writing tasks, and teachers are required to give students timely feedback.

The liberal arts college generally attaches importance of writing, and the "intensive writing" course is also considered to be one of the top ten outstanding undergraduate teaching experiences in the United States. "Intensive writing" refers to the requirement that students use different forms (verbal, written, performance), different methods (qualitative, quantitative, mixed), and different style, from different disciplines, across different professional fields, to repeated exchanges and writing for different readers in different levels (all grades). This approach focuses on cultivating college students' rational thinking ability [9].

Professor in Bowdoin College pointed out that extensive reading, critical thinking, and flexible writing is three lifelong treasures that the college can provide to its students. The school's students also believe that a major feature of the liberal arts college is the importance of reading and writing. Williams College requires all students in the school to take two "intensive writing course" [10]. This writing course requires at least 20 pages per person per semester, and no more than 19 students per classroom. McAllister College requires ensuring that all students are trained in writing, and hopes that students will see writing as "an iterative process" and each student will receive timely feedback on the method and content of writing. The school clearly stipulates that after finishing the freshman seminar, students must attend a writing-required course before the senior year, with a minimum of 4 credits.

The strict requirements of the liberal arts college for reading and writing are not only for students majoring in liberal arts. Students of science major also need to write experimental reports with clear structure, grammar, and well-written words. Almost every course takes a lot of emphasis on writing. For example, the writing tasks given to students by the professors of the Macquarie College in the class of Introduction to English Writing include: Write 12 poems or essays in 14 weeks, write weekly notes, attend three recitations and write reviews, complete a final project and report in class. A professor from the Department of Politics has assigned 5 assignments to the students. The first four articles are 10 paper essays and the last is a 30-page essay. All papers are subject to repeated revisions. A professor of mathematics usually arranges a large number of on reading assignments for students. He also asks students to write blogs and small papers based on reading materials. Even if they do math problems, students are guaranteed to have a lot of reading, and they must write reading materials. Pointing out where they feel most interested and most difficult, a student in the liberal arts college referred to the writing of his own course essay. From conception of finishing [11], he took more than two months to complete a total of eight manuscripts. In this process, there were numerous exchanges with teachers of the writing instruction center.

The liberal arts college also attaches great importance of cultivating students' abilities in quantitative analysis, logical reasoning, scientific exploration, and second language. These are implemented through different disciplines and skills-focused courses to help students

master the tools and abilities of lifelong learning, these are closely related to the objectives of talent cultivation in the liberal arts college. In addition, the liberal arts college is also concerned about the student's social participation. Through a variety of courses and extra-curricular activities, internships, and other forms of learning in service, help students to connect learning content with real-world experience and develop their social responsibility.

V. THE EDUCATION ENVIRONMENT: ALL MEMBERS PARTICIPATE IN CREATING A SUPPORTIVE AND ACTIVE COMMUNITY ATMOSPHERE

The key to education is to provide a suitable environment for students to grow through activities. Because learning is active, we must design a series of activities to make students move. Actions can promote effective learning. Learning is an experience and it is the interaction between students and the environment. Some researchers have suggested that if students' involvement and hard work are the decisive factors for the school's influence [12], the key to the problem lies in what ways the school has adopted to shape its learning environment and interpersonal environment to attract and promote students' Participate and integrate. After controlling the characteristics of students entering school, it was found that "what students have experienced after registering for admission" is more important than the question "where do you go to school?" That is to say, the educational environment and education process that universities provide for students deserves more attention [13]. It is important to combine the context of the "Liberal Arts College" to analyze its connotation when we emphasis on the definition of "Liberal Education". An important difference between larger universities and selective liberal arts colleges is their unique community atmosphere on. It can even be said, if lack this kind of environment and atmosphere, the liberal arts college's curriculum system, teaching content, teaching methods, and the entire teaching process lose their guarantee and characteristics. Community atmosphere is one of the elements of liberal arts education in contemporary liberal arts college.

During the field survey at McAllister College, you can feel that the liberal arts college has a strong and positive community atmosphere. Whether teachers or education administrators, or ordinary teaching assistants, they position themselves as "educators". Almost all of them work together to create an educational environment for students inside and outside the classroom. From the teacher to the educational coordinator, from the principal to the Registrar, from the librarians to the dormitory administrators, they are working hard to provide the greatest support and a pleasant experience of college education for the students, improving their sense of belonging to the school. This is closely related to the school's positioning of "education", "university" and "school responsibility". They believe that education is an experience of fundamental change. The university is a community of learners, all the students, employees, and

teachers have the potential to achieve personal, interpersonal and intellectual transformation and growth through their own efforts and cooperation. Therefore, the responsibility of the school is to create an environment for the students and faculty members with various cultural backgrounds to respect the world's multicultural environment, which advocates and pursue academic excellence and ethical norms, at the same time, the environment is also challenging, respectful and respectful [14].

In order to create an ideal educational environment, different schools have different practices. In addition to creating a variety of hardware and software environments that facilitate communication between teachers and students, implementation of accommodation and selective enrollment are important approaches. Unlike other colleges in the United States, the liberal arts college generally requires students to live in school dormitories, ranging from four semesters to eight semesters. Because of living in the accommodation as part of school education, the liberal arts college generally asks students live in the school dormitory, ranging from four semesters to eight semesters. The space design of the dormitory building emphasizes the promotion of communication among students. Dormitory managers have a high degree of specialization (generally have a master's degree in student management), and have a strong sense of service and education. The dormitory life department works closely with the academic and administrative departments, pays attention to the basic accommodation functions and educational functions of the dormitory.

The unique educational environment and community atmosphere of the liberal arts college are what the school intends to create and the students themselves create. By setting admission criteria and all kinds of the percentage of students, the school clearly identifies a group of students who share the philosophy of liberal arts education also have diverse cultures and socio-economic backgrounds. Then it uses various education and teaching activities as the carrier to promote interaction and exchange among students and teachers so that they can interact with each other. In other words, an outstanding liberal arts college is created by the students who lived and studied there. Therefore, students recruited by the admissions staff must be able to create extraordinary opportunities and at the same time they can benefit from this extraordinary opportunity. This is an important reason for liberal arts colleges to implement selective enrollment [15].

VI. THE SYSTEM GUARANTEE: TEACHER-CENTERED MANAGEMENT SYSTEM

Through the interviews with teachers, the classroom observations, and descriptions of students, the reason why the liberal arts college has excellent teaching practices is because teachers have the following common characteristics: The first task is love teaching. Teachers explore teaching theories and methods actively; the second is love of students, they care about the growth of students, pay attention to students' interests, and focus on

cultivating students' learning ability and thinking ability. The third is their love of learning and willingness to cooperate; the fourth is they good at innovating, like to explore new courses or try new teaching methods. The "secret" of such a teacher group is that the liberal arts college has a series of management systems, such as teacher recruitment systems, teacher evaluation systems and teacher support systems.

A. Teacher Recruitment Mechanism

Teacher recruitment is an important part of the construction for teachers. What kinds of people are recruited by what kind of standards, who is responsible for recruiting, how to recruit, how to manage and evaluate after recruitment, all of which depend on the school's philosophy of running schools and the positioning of the school, and also shape the personality and characteristics of the school. The faculty recruitment mechanism in the liberal arts college reflects the characteristics of "teaching centered". The first is to combine the orientation and education mission of the university with undergraduate education and teaching. A comprehensive scientific argumentation is required for every newly-employed teacher post to ensure that newly recruited teachers can mostly meet school education and teaching needs. Secondly, while screening and interviewing candidates for the post of teacher, colleges should focus on their teaching ability. The third is to pay attention to the interaction and balance between administrative power and academic power during the recruitment process, and academic power dominates. The fourth is to play the role of peer evaluation, so that in-service teachers can participate in the selection of new teacher candidates. Fifthly, pay attention to the opinions of students and invite students to participate in the teacher recruitment interview process. Sixthly, special emphasis is placed on organizational cultural identity. This recruitment mechanism aims to ensure that schools have recruited the "right person" from the very beginning [16], that is, who have the professional ability, also love teaching and good at teaching.

B. Teacher Evaluation System

The teacher evaluation system is like the "baton" which guides teachers' behavior. How teachers allocate time and energy among the three activities of teaching, research, and service is inseparable from the assessment of the school. The reason why teachers in the liberal arts college are willing to teach is not only because they love teaching, but also the various evaluation systems give a high degree of importance to teach. Even if an examination of scientific research is necessary to examine its promotion of teaching effects. Specifically, the teaching orientation of the evaluation criteria for teachers is obvious; the "teacher" role of the evaluation target is in the first place; Evaluators are mainly teaching-related; assessment materials are highly relevant in teaching; evaluation cycles are sufficient for teachers' teaching effectiveness. This evaluation system is intrinsically consistent with the teacher recruitment mechanism, and

its feasibility is benefited from the school's series of teachers' support and system training [17].

C. Teacher Support System

The recruitment system of the liberal arts college plays a role like a "gatekeeper"; Teacher evaluation system plays a guiding role. School post-employment management and services play a role for ensuring that teachers can successfully pass various assessments to achieve individual career development goals and school-oriented goals. In fact, as an undergraduate school that focuses on teaching, the liberal arts college has a high demand for teachers' scientific research. It is worth noticing that the liberal arts college places more emphasis on comparison with similar institutions instead of research universities. Many teachers feel that they are under pressure. "Because teaching and research are very important, and scientific research must serve teaching". In spite of this, nearly 90% of teachers are able to pass the tenure review because the liberal arts college provides appropriate support for teachers so that they can maintain a good balance between teaching and research. These supports mainly include financial support, timely support and emotional support [18]. For example, the liberal arts college usually has specialized teaching and learning research centers to provide teachers with long-term, systematic teaching training, adequate research funding, establishment of an academic annual leave system, reduced teaching hours for new teachers, reduced service workload, and so on. In addition, they also help new teachers adapt to the school's culture and improve teaching through a variety of measures. They encourage senior teachers to have lunch with new teachers, requiring senior teachers to observe the classrooms in the first year of new employees, and a farewell party for retired teachers.

Talent training is a systematic project involving multiple factors and multiple links. The talent training model also differs depending on the school's tradition, mission, level, type, orientation, characteristics, and student development needs. The undergraduate education model of the liberal arts college can be called quality education. The number of students is small, the cost is high, and the educational effect shows a long cycle. It can be imitated by non-general institutions. However, they insist student-centered philosophy in the cultivation of undergraduate talent, emphasizing a solid foundation for the future development of students. Fully respect students' subjectivity and autonomy, and attach importance to students' participation and integration in the teaching process. We use this system to guarantee the central position of teaching, participation of all staffs, and all-round construction of an active and supportive educational environment which is worthy to learn in the promotion of higher education in China.

ACKNOWLEDGMENT

This work is supported by the Reserach Project on Teaching Reform of Undergraduate College in Shandong

Province (Z2016M061) and Shandong Province Key Laboratory of Digital Media Technology.

REFERENCES

- [1] D. S. Yu and N. W. Cui, "Liberal education: Historical analysis on the institution of college," *Journal of Higher Education*, pp. 96-102, Oct. 2014.
- [2] C. C. Wang, "Research on the selective liberal arts college i-n the united states of America," Hua zhong University of Science and Technology, 2009.
- [3] C. Pomono, "Pomono college review," July. 2005.
- [4] P. F. Kruger, *The Rise and Fall of the American Academy of A-rts and Sciences: Kenyon College Records*, Bei Jing, China, Peking University Press, 2005.
- [5] C. Carleton. (May 2005). Our Mission. [Online]. Available: <https://apps.carleton.edu/about/mission/2017-05-20>
- [6] C. C. Wang, "Research on the selective liberal arts college i-n the united states of America," Huazhong University of Scie-nce and Technology, 2009.
- [7] Y. Yan. A Study of Contemporary American Liberal Arts College of Liberal Arts Education Characteristics. [Online]. Available: <http://www.hrbnu.edu.cn/>
- [8] C. Boyer, "Reinventing undergraduate education: A blueprint for America's research universities," The Boyer Undergraduate Commission on Educating Undergraduates in the Research University, Sep. 1998.
- [9] G. D. Kuh, "Excerpt from high-impact educational practices: What they are, who has access to them, and why they matter," Association of American Colleges and Universities. 2008.
- [10] Y. F. Chen, *Game American Undergraduate - Experience the Elite Education of the College of Arts and Sciences*, Shanghai, China. Oriental Publishing Center, 2009, pp. 37-57.
- [11] C. C. Wang, "Students' learning centered: Analysis on the characteristics of teaching process in the selective liberal arts college in the united states," *Research in Higher Education of Engineering*, pp. 128-133, Feb. 2010.
- [12] J. M. Zhao, "Open the black box: The scientific foundation of undergraduate learning and development (Part 1) —A series of study of the sc undergraduate education reform in the USA (2)," *Research in Higher Education of Engineering*, pp. 31-52, Mar. 2017.
- [13] E. T. Pascarella and P. T. Terenzini, *How College Affects Students*, San Francisco, U.S.: Jossey-Bass Publishers, 1991.
- [14] Macalester College. (Feb. 2017). Mission & History. [Online]. Available: <http://www.macalester.edu/about/mission/2017-02-20>.
- [15] C. C. Wang, "Teaching centered: How does America liberal arts college hire the 'right faculty'," *University Education Science*, pp. 68-73+103, Feb. 2017.
- [16] C. C. Wang, "Teaching-centered: Analysis of the faculty assessment system in U.S. liberal arts colleges," *Fudan Education Forum*, pp. 96-101, May. 2016.
- [17] C. C. Wang and N. X. Zhang, "Liberal arts college in the United states: watching the development path of small colleges—an interview with Brian Rosenberg," President of McAlester College, USA. University (Academic), May. 2016, pp. 4-29.
- [18] G. O. Young, "Synthetic structure of industrial plastics," in *Plastics*, 2nd ed. vol. 3, J. Peters, Ed. New York: McGraw-Hill, 1964, pp. 15-64.



Meng Tian born in 1981. M.Eng. Main research contents include human resource management and computer application.



Hui Liu born in 1978, and received the M.S. and Ph.D. degrees from Shandong University, Jinan, China, in 2004 and 2008 respectively. She is currently professor and master supervisor with the School of Computer Science and Technology, Shandong University of Finance and Economics, and the member of CCF. Her main research interests include image processing, machine learning.



Shanshan. Gao received the M.S. and Ph.D degrees from Shandong University, Jinan, China, in 2005 and 2011, respectively. She is currently a professor with the School of Computer Science and Technology, Shandong University of Finance and Economics. Her current research interests include computer graphics, image saliency detection and image segmentation.