Exploration on the Construction of Research-Oriented Study Groups in Colleges and Universities Against the Background of "Mass Entrepreneurship and Innovation"

Yuqing Zhang[✉]

College of Humanities, Hubei University of Chinese Medicine, Wuhan 430205, Hubei, China
zyq95@hbtcm.edu.cn

Abstract. The ability of innovation and entrepreneurship is an important manifestation of students applying what they have learned and promoting the transformation of discipline practice ability. This paper introduces the overall objective, team construction, activity mode, and achievement, reflection and prospect of innovation and entrepreneurship of the research-based study groups created by the author, in order to provide reference for the research-based learning practice in colleges and universities against the background of "mass entrepreneurship and innovation".

Keywords: College students · Innovation and entrepreneurship · Research-based study groups

1 Introduction

General Secretary Xi Jinping pointed out in his congratulatory letter to the opening of the 2013 Global Entrepreneurship Week China Station: Youth is the hope of the country and nation, innovation is the soul of social progress, and entrepreneurship is an important way to promote economic and social development and improve people's livelihood. Innovative education has become one of the key standards for the level of university education and major universities have taken stimulating students' potential for innovation and entrepreneurship as their teaching objectives and directions. Research-based learning and innovation and entrepreneurship education have the same value appeals, the integration of theoretical foundations, and the realization of paths. Therefore, the advantages and functions of research-based learning should be brought into play to improve the effectiveness of innovation and entrepreneurship learning, so as to help the solid advancement of innovation and entrepreneurship education.

2 Research-Based Learning and College Students' Innovation and Entrepreneurship

Research-based learning, also known as inquiry-based learning, is a talent training model oriented to ability development. It takes the improvement of students' ability as the training objective, provides students with a variety of learning experiences as the training path, and adopts a comprehensive evaluation system to evaluate students' learning effects [1]. Innovation ability refers to the ability to use one's existing knowledge and information to propose new concepts, new theories, or invent new technologies and products, so as to create social value and realize personal value. It can be seen that innovation ability is an important ability and quality of high-quality talents and it is of great significance in promoting the development of social economy and technology.

In the era of knowledge economy, the acceptance of knowledge becomes less important, and what matters are the selection, integration, transformation and operation of knowledge [2]. What students need to master most is the "core" knowledge that covers a wide range of areas, is highly transferable, and has a high degree of generalization. And this knowledge can't be "taught" by words, which can only be obtained by students' active "construction" and "re-creation". This requires the innovation consciousness and innovation ability of college students to play an active role in it.

3 The Overall Objective and Training Program of the Scientific Research Group

3.1 Overall Objective

Under the unified planning of the teacher, the civil law study and scientific research group (hereinafter referred to as the "scientific research group") will consolidate the professional knowledge base of civil and commercial law in a planned and organized manner, promote the formation of a good style of study, learn philosophy and social science research methods, and cultivate innovative spirit and practical skills. By participating in innovation and entrepreneurship training programs at all levels and extracurricular scientific and technological works competitions such as "Challenge Cup" and "Yuanzhi Cup", students can improve their scientific research ability, enable themselves to grow in scientific research, and form a learning community and growth community.

3.1.1 The Cultivation of Explicit Ability

The so-called cultivation of explicit ability refers to the more intuitive ability output that students contact and master in the process of scientific research training in the study group, such as literature review and data collection ability, the use of related software and data processing and analysis ability, empirical research investigation ability, scientific research process record and thesis writing ability, etc. The ability to obtain information is the basis for engaging in scientific research, which includes literature review and collection of related data, including university library paper literature, books and reference materials, and electronic literature, e-books and other professional resources

under the network platform. In the undergraduate education stage, because the main job of students is to learn the existing curriculum knowledge system, there is relatively little research-based training, and information retrieval courses and practical applications are often lacking, resulting in weak information retrieval ability of students. Through learning and practice, students will not only master the ability to acquire information, but also improve their innovative thinking skills such as induction and deduction, and have the ability to learn for life. Through the flexible use of document management software, students' ability to use information resources to analyze and solve problems has been continuously strengthened. In addition to the learning and use of document management software, data processing software, etc., students can effectively deepen their professional basic knowledge while gradually establishing research ideas and expression methods for research-based learning. Through social research, students' originality consciousness can be displayed, and their research ability can be exercised in the process of data collection, gathering, induction and arrangement. The writing of the final scientific research results has greatly improved the students' rigorous scholarship and precise expression ability.

3.1.2   The Cultivation of Implicit Ability

Different from explicit ability, the cultivation of implicit ability is a kind of ability improvement that is internalized in students' thinking and behavior, such as the ability to discover problems, ask questions, analyze problems, and innovative thinking and so on. Discovering, asking and analyzing problems is the basic process of research-based thinking. Different from the passive acceptance of students in traditional learning classroom, in the scientific research group, students need to think proactively, and extract the essential laws, crux of problems and solutions of research topics from literature, related materials and data. This change in mindset is a major challenge for students, and research study groups are a way to foster team work and collaboration. Students can make full use of teachers' scientific research experience and classmates' brainstorming, and subtly realize the change of thinking level in the process of research project. Through the accumulation of practice in research study groups, students can avoid rigid thinking and cultivate innovative thinking step by step.

3.2   Training Program

The research-based study group sets training programs according to the training priorities and objectives of students at different stages: (1) Collaborative innovation education: For the first-year undergraduate students, since the professional courses have not yet started, it should focus on cultivating students' sense of collaborative innovation as well as their sense of identity and interest in learning this major. (2) Cultivation of basic innovation ability: For the second-year undergraduate students, it is necessary to focus on the guidance of the "Civil Law" course, and through the development of innovation and entrepreneurship projects, to cultivate students' innovation ability and basic project research and development ability. At the same time, it is also needed to strengthen the cultivation of students' comprehension ability. (3) Comprehensive innovation and entrepreneurship skill training: For senior undergraduates, it is necessary to focus on the

training of innovation and entrepreneurship skills, incubate the innovative cultivation projects of undergraduates, and strengthen the cultivation of professional abilities of senior students in analyzing problems, solving problems, and practical operation.

4 The Construction and Implementation of the Scientific Research Group

4.1 Formation

The scientific research group was established in 2017 and the author is fully responsible for the organization, management and implementation of it, such as guiding students to apply for projects, publish papers, and participate in competitions. The operation of the scientific research group fully takes into account the level of students at the undergraduate level. The individual knowledge reserve has not yet reached a certain level, and the individual strength is not enough to directly deal with the subject research. Therefore, by encouraging students' teamwork to participate in the research of specific topics, it avoids the premature pulling up of seedlings to help them grow of individual students, and reduces the powerlessness and frustration of students due to the limitation of individual knowledge level. The scientific research group currently has 29 undergraduates at school (13 seniors, 12 juniors, 4 sophomores) and 28 graduates. There are usually 2–3 research groups, and at most 4 research groups. Through team discussion, division of labor and cooperation, with the help of faculty advisers, brainstorming is gradually embedded in specific research topics, and group activities are carried out for the purpose of helping students to grow actively and confidently.

The selection of scientific research group members generally begins in the second semester of freshman, with "interest + ability" as the selection criteria. The selection method is "application + assessment", that is, applicants must pass a one-month assessment period and successfully complete all tasks during the assessment period before they can join the group. The group implements the echelon training model of "guiding the new with the old, and retiring the old after the cultivation of the new", focusing on individualized training and discovering members with active thinking and ideas in the training process. At the same time, faculty advisers will also pay attention to finding students with strong interest in learning, outstanding ability and willingness to innovate in the teaching of professional courses, and bring them in.

4.2 Basic System

4.2.1 Regular Meeting System

The regular group meeting is not only a "concentration place" for information gathering, but also a "garden of flowers" for group members to express their opinions. Regular meetings can be the best place for students to share their gains after reading, studying, thinking and researching and to solve their doubts. Regular meetings are divided into the general meeting (once every two weeks) and the regular meeting of each research group (once a week). The time and place are relatively fixed. Regular meetings are mainly offline, supplemented by online (Tencent Meeting, QQ Conference, etc.).

4.2.2 Activity Record System

For the various activities of the scientific research group, literal and video data must be reserved. Taking the regular meeting as an example, the minutes of the meeting are the records of the discussion gist of the regular group meeting, an important basis for the group members to revise and improve their own achievements, and also a key reminder of the next research task or work arrangement. Within a specified time after the end of the regular meeting, the recorder should promptly send the minutes of the meeting to the QQ group file of the scientific research group, so that members can download and read, and revise and improve their research in time. There is also a unified format for the writing of the minutes of the meeting, and they are compiled and stored as group materials. Meeting photos and short videos are also an important part of the minutes of the meeting, which are important materials to record the activities and development of the scientific research group.

4.2.3 Elimination Mechanism

In practice, the author found that some students participating in the scientific research group don't really want to improve their professional quality, scientific research ability, and cultivate innovative spirit, but have utilitarian ideas and impure motives. The purpose they participate in teams, apply for projects, and publish papers is just for the sake of scientific research, for bonus points for scholarships, to increase employment weight, or to apply for recommended exemption graduates to enjoy the policy of bonus points. Based on this idea, it is impossible for these students to devote themselves to learning and scientific research activities. The main manifestations of such students are: (1) worrying about gains and losses, haggling over every ounce; (2) being absent from group activities for no reason; (3) being impetuous in doing things and procrastinating in completing tasks; (4) being lacking in cooperation spirit.

In view of the above problems, the establishment of the elimination mechanism is very necessary, which mainly includes the following: (1) Implementing the bottom out. It strictly records the completion of attendance, learning tasks and scientific research tasks. Each section has quantitative points (recorded by faculty advisers and research group leaders), and members are eliminated according to a certain percentage at the end of each semester; (2) The basic principle of contribution as the signature of achievement. The signatures of project applications, innovation and entrepreneurship competitions and research results are strictly in accordance with the principles of personal participation and contribution; (3) Voluntary departure from the group is allowed. It allows members to voluntarily choose to leave the group according to their own circumstances and time and energy.

4.3 Activity Module

4.3.1 Learning Section

The premise and foundation of innovation and entrepreneurship for undergraduates is solid professional theory and scientific research literacy, so learning activities are the most important part of scientific research group activities. According to the disciplinary nature and characteristics of this major, this is mainly achieved through the professional knowledge base section and the scientific research basic ability section. (See "Table 1").

Table 1. List of learning section

(1) The professional knowledge base section		
	Main content	Mode of activity
Question of the day	According to the teaching progress of the course, select past exam papers of the Master of Law and the National Vocational Law Qualification Examination (NVLQE) to consolidate the basic knowledge.	Publish and correct daily online in QQ group
Case analysis	Teachers select past exam papers of the Master of Law and the NVLQE and typical social cases, and conduct case analysis training to cultivate law language and logical thinking.	Every week, teachers publish homework in QQ group, and students submit homework online. Some typical cases are discussed online and offline.
Interpretation of key articles of law	Interpret and analyze the legislative background, legislative purpose and specific connotation of the key and highlighted articles of law in the Civil Code.	Assign tasks in the QQ group in advance, and share and discuss during regular meetings.
Literature reading	According to the teaching progress of professional courses and topics, high-quality literature is selected to carry out literature reading training.	Establish a literature library, and require students to read no less than 2 articles every week and write and submit a paper version of the literature reading report.
Cutting-edge information	Pay attention to legislative trends, typical hot cases, professional annual meetings, etc., and grasp the cutting-edge information and legislative status.	Mentors and members share legislative trends, hot cases and high-quality annual meeting summaries in the QQ group, and participate in some academic annual meetings if they can.

(continued)

Table 1. (*continued*)

(2) The scientific research basic ability section	
	Mode of activity
Document retrieval ability	1. Encourage students to take the course "Document Retrieval"; 2. Read relevant literature and works; 3. Carry out document retrieval training and encourage members to participate in document retrieval competitions.
Writing ability	1. Regularly organize the study of "Legal Paper Writing", "Legal Paper Writing and Information Retrieval" and other works, and require writing reading notes and communicating in regular meetings. 2. Students are encouraged to select interesting perspectives or hot events to write short essays, and excellent essays will be exchanged and discussed at regular meetings.
Social research ability	1. Regularly organize the study of "Social Survey Research Methods" and other works, and learn social research methods of philosophy and social sciences, such as sampling, questionnaire design, data collection methods, data processing and survey report writing. 2. Encourage each research group to carry out social research and practice and summarize and exchange experience in a timely manner.

4.3.2   Scientific Research Section

4.3.2.1 Determining the Topic and Forming Groups

The scientific research group is generally divided into 2–3 research groups according to the research direction determined under the guidance of the teacher. In terms of topic selection, it is necessary to cultivate the scientific research thinking of "low in and high out", "from shallow to deep", "jumping" and "innovative" of students. The topic selection should be based on one's own professional advantages and pay attention to social phenomena. At the same time, it is necessary to follow the principle of "closeness, smallness and reality". "Closeness" means close to reality, close to study and life, and close to the subject background; "smallness" means that the incision should be small, researching from small things, small problems, and small phenomena, so as to see big things through small ones; "reality" means practical, in other words, the subject should be practical, with real meaning or inspiration to people's real life.

According to the requirements of the competition system of various competitions, the composition of the research group is generally 5–8 people, including the team leader and the deputy team leader, both of which are assumed by senior members. Students choose to join the research group according to their own interests and abilities, and make a two-way choice.

4.3.2.2 Developing and Implementing Research Plans

Each research group holds regular online or offline discussions. Before the discussion, students consult materials, organize materials, and refine their opinions according to the needs of their research topics. During the discussion, students express their opinions, and under the guidance of teachers, further condense their arguments and implementation plans. After the discussion, the students divide the labor according to the implementation plan and carry out research work. The leaders of each research group regularly report the progress of the group's research and the problems to be solved to the mentor.

4.3.2.3 Regularly Discussing and Forming Results

The research of each research group follows the continuous in-depth thinking and follows the steps of the aforementioned discussion to cycle up and gradually approach until the research purpose is achieved. After a certain period of research, the group members need to conduct detailed discussions at the regular meeting, from the sorting of the literature review to the drafting of the outline and the writing of the manuscript, and the comments and suggestions of the discussion should be recorded in the meeting minutes. According to the discussion opinions, each group implements the paper writing work and realizes the output of the results.

4.3.2.4 Paying Attention to Team Building

From incubation to maturity, a project needs to be constantly developed and updated. The research-based study group model ensures that research projects are not stalled by the graduation of a particular student. Under the leadership of mentors, newly recruited undergraduates can continuously improve their innovation and entrepreneurship projects, achieve an accumulation, and form more mature innovation and entrepreneurship projects. The scientific research group adheres to the principle of "guiding the new with the old" and forms a group framework with stepped development. The formation of a stepped group with the junior as the captain and the sophomore and the freshman as team members ensures the sustainable development of the project.

4.3.3   Competition Section

4.3.3.1 Screening Projects

According to professional characteristics and research fields, the scientific research group mainly participates in various innovative projects and competitions, such as the school-level and provincial-level "Challenge Cup" College Students' Extracurricular Scientific and Technological Works Competition, and the national and provincial-level "College Students Innovation and Entrepreneurship Project Approval" and so on. Through the continuous incubation of various topics in the early stage, the mentor screens out suitable projects for students to participate in the competition, and prepare materials according to the requirements of various competitions at all levels.

4.3.3.2 Preparing Entry Materials

In the preparation of entry materials, the core part is the application form and portfolio, which should be accurate in content, and standardized in language and format. Because undergraduates have little experience in project declaration, they need the guidance and revision of their mentors in the preparation of these materials.

4.3.3.3 Simulation Exercise

At present, most innovation and entrepreneurship competitions will set up works display and defense links, so the simulation exercise before the competition is very important. On the one hand, omissions and deficiencies can be found in the exercise, and adjustments can be made in time; on the other hand, possible situations can be envisaged in advance and a response plan can be formulated.

4.3.3.4 Being Good at Summarizing Experience

Any competition has experience and lessons. The period after the competition is not the end of the project, but the starting point of a new project. Only by summarizing the previous experience can the project be continuously optimized and upgraded, and can the competitive project be completed.

At the same time, every competition is a hard-won learning opportunity. On the one hand, students can learn the excellent projects and innovative ideas of their peer colleges and universities, and experience the unique ways of thinking and competition styles of student groups in different schools and different professional fields; on the other hand, students can see their own shortcomings and their own advantages, enhance self-confidence and accumulate competition experience.

5   Effect Analysis and Prospect

5.1   Effect Analysis

5.1.1   Outstanding Scientific Research Achievements

After 5 years of practice, the civil law study and scientific research group has achieved excellent results in the publication of papers, the establishment of innovation and entrepreneurship projects for college students at all levels, and various competitions at all levels (see "Table 2").

5.1.2   The Preliminary Results of Scientific Research Quality Training are Achieved

The members of the civil law study and scientific research group are from Grade 2015–2020, and there are three generations of graduates so far. There are 9 members in Grade 2015, 1 obtained the postgraduate recommendation (Huazhong University of Science and Technology), 3 passed the postgraduate examination, 4 passed the NVLQE, and 1 became the civil servant. There are 9 members in Grade 2016, 1 obtained the postgraduate recommendation (Hunan University), 2 passed the postgraduate examination, 1 passed the NVLQE, 1 became the civil servant, and 1 was admitted to the selected graduate.

Table 2. List of scientific research achievements (as of April, 2022)

Achievement type	Total	General periodical	The key magazine of China technology	Peking University core periodical
Published papers	16 articles	10 articles (the first author)	4 articles (the first author)	2 articles (the second author)
College students Innovation and entrepreneurship projects	National level	Provincial level	School level	
	3	8	8	
College Students' Innovation and Entrepreneurship Competition (Challenge Cup, Yuanzhi Cup, etc.)	National level (grade)	Provincial level (grade)	School level (grade)	
	1 (third prize)	1 (first prize) 1 (second prize) 1 (third prize)	3 (first prize) 4 (second prize)	
Outstanding bachelor Graduation thesis	Total (article)	School level (article)	College level (article)	
	8	3	5	

There are 10 members in Grade 2017, 1 obtained the postgraduate recommendation (Nanjing University of Science and Technology), 3 passed the postgraduate examination, and 1 was admitted to the selected graduate. Among the members of Grade 2018, 1 obtained the postgraduate recommendation (Shenzhen University), and 1 passed the postgraduate examination. Through follow-up visits and active feedback from graduates, the author learned that many students have been trained by their mentors with good scientific research literacy because of their undergraduate scientific research experience. Students currently engaging in law-related work, such as medical departments of medical institutions, in-house lawyers, lawyers, and civil servants, have shown the courage to develop innovative spirit and good professional quality.

5.1.3 Promoting Teaching and Learning, and "Teaching" and "Learning" Go Hand in Hand

In guiding students to carry out learning and scientific research sections, mentors need to constantly explore and innovate teaching methods, stimulate students' innovative interest, and use the information obtained by communicating with students to continuously improve the teaching content and teaching methods of professional courses. The process of guidance not only improves the students' learning ability, but also improves the teachers' teaching level. Students can consolidate professional knowledge base, cultivate scientific research ability and literacy, cultivate cooperative spirit, and clarify learning objectives and career planning in various activities of the group. Teaching and research

going hand in hand truly practices "using the science of education to implement scientific education", thereby improving the quality of teaching in an all-round way [3].

5.1.4   Reshaping the New Teacher-Student Relationship

In the research-based study group, a new type of teacher-student relationship from "teaching to guide" and "authority to equality" has been formed. The face-to-face communication and interaction between teachers and students is more frequent and it also extends to academic planning, life planning and social communication beyond the subject, forming a good emotional bond.

5.2   Reflection and Outlook

5.2.1   The Team of Faculty Advisers Should also be Expanded

Faculty advisers are an important part of the research-based study group. At present, there is only one mentor (the author) in the scientific research group, and in addition to the author's teaching and scientific research tasks, there are various daily tasks, which require a lot of time and energy. Therefore, it is really necessary to expand the team of faculty advisers. It can be determined according to the specific number of people, but it should not be less than 2 people, and their professional background and academic direction need to be considered, in order to form a certain complementation [4].

5.2.2   The Member Selection Mechanism Needs to be Improved Urgently

At present, the scientific research group has not really established a scientific and effective member selection mechanism [5]. On the one hand, some outstanding undergraduates may be eliminated and the final selected students may not be really interested. Some students just want to add a (research) resume in their university career, which affects the research effectiveness to a certain extent. On the other hand, some outstanding undergraduates don't have enough knowledge of the research-oriented study group, so they refuse to sign up for the fear of affecting their study energy and affecting their studies. Therefore, how to attract more outstanding students and how to eliminate students with utilitarian purpose or obvious lack of ability and build a more scientific, reasonable and effective member selection mechanism is extremely urgent.

5.2.3   The Training Period of Scientific Research Ability is Short

The basis of scientific research activities is the study and deepening of professional theory. The cultivation of a subject or project requires at least two years before it is possible to obtain certain research results and to have the strength to participate in various innovation and entrepreneurship competitions. According to the curriculum setting plan of this major, "Civil Law" (1) and (2) are offered in the third and fourth semesters respectively. Therefore, the members of the freshman and sophomore are more trained at the level of learning. The senior students, especially the students of the fourth year, have to prepare for internships, postgraduate entrance exams, civil service exams or employment, and basically withdraw from group activities [6]. This has led to the problem of a short

(up to one year) training period for scientific research capabilities, which directly affects the advancement and continuous development of subjects or projects and needs to be solved urgently.

6   Conclusion

The research-based study group follows the student-oriented objective and is applied to the cultivation of undergraduates' innovation and entrepreneurship ability, which can make up for the current situation of insufficient practical teaching and organically run through teaching, practice and scientific research. Teachers can plant the seeds of innovation and entrepreneurship from the cultivation of interest in the first year of undergraduates, exercise the basic innovation of students in the second year, and finally improve the innovative professional skills of students in the senior years, carrying out activities in a step-by-step manner according to the characteristics of students' learning[7]. Through initiative practice, students have a sense of innovation and gradually grow into applied talents in terms of innovation and entrepreneurship.

Authors' Contributions.   This paper is independently completed by Yuqing Zhang.

References

1. Mo, Jiafeng. 2018. The paths of research-based learning in cultivation innovative talents—taking south china university of technology as an example. *Research in Higher Education of Engineering* 03: 158–164 (in Chinese).
2. Luo, Xueqing, Fei He, and Yongfeng Li. 2018. Research on undergraduate research-based learning based on the cultivation of innovation ability. *Journal of Higher Education* 13: 33–35 (in Chinese).
3. Wen, Qiufang. 2015. Developing a theoretical system of production-oriented approach in language teaching. Foreign Language Teaching and Research, 47 (04): 547–558+640 (in Chinese).
4. Zhou, Quan, Guofu Cheng, Jinhua Xiao, Xiaoxiong Wu, Chi Zhang, Siwen Jiang, and Junlong Zhao. 2013. Exploration and practice of the training system of college students' scientific and technological innovation ability. *Higher Agricultural Education* 09: 87–91 (in Chinese). https://doi.org/10.13839/j.cnki.hae.2013.09.024
5. Jing, Jiana, Yan Sun, Xu Zhun, and Minghua Zhou. 2021. The way to cultivate scientific research and innovation ability and quality of college students against the background of new engineering—Taking environmental engineering as an example. *Journal of Higher Education* 7 (S1): 146–149 (in Chinese). https://doi.org/10.19980/j.CN23-1593/G4.2021.S1.040
6. Li, Xiaoying, Lihong Guan, Changqin Jing, Juntang Lin, and Ciqing Yang. 2022. Research on the application and practice of undergraduate tutorial system in the cultivation of innovative talents—A case study of school of life sciences and technology, Xinxiang medical university. *Journal of Western* 04: 105–109 (in Chinese). https://doi.org/10.16721/j.cnki.cn61-1487/c.2022.04.026
7. Deng, Zhangsheng, Lizhi Deng, and Lihong Wang. 2021. On university innovation and entrepreneur mentors' measures of self-positioning, mentoring and improvement. *University Education* 12: 152–155 (in Chinese).