

Comprehensive Comparison of Independent Study in the United States and China

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Independent study has emerged and developed rapidly in China in recent years. In open literature, no studies have compared the differences of independent study in the universities in the United States and China. In the present study, comprehensive comparisons were made from multiple aspects, including learning objectives, organization of the course, and evaluation of students. Results show that the learning objectives are similar, but the details of implementing and executing the course are slightly different. The comparison provides the possibility of improvement of the course.

Keywords: independent study, undergraduate research, comparison, United States, China

Introduction

Independent study, also known as undergraduate research or special topics, is defined as an inquiry or investigation conducted by an undergraduate student that makes an original intellectual or creative contribution to the discipline by the US-based Council (Mieg & Haberstroh, 2022). In the 1960s, some higher education institutions in the United States began to establish undergraduate research programs. For example, the Massachusetts Institute of Technology (MIT) established a teaching system for undergraduates to participate in research. Each laboratory had a full-time professor serving as the advisor, who would publicize project requirements, provide consultation on evaluation criteria for students' research capabilities (Feng & Sun, 2014).

Some of the universities in China have started to offer such courses for undergraduate students in recent years, and some of the researchers in China started to do research in this field. Du et al. (2022) proposed an integrated teaching-learning-administration evaluation system for independent study, considering the combination of teacher evaluation, student evaluation and administrator evaluation. Results showed that the new evaluation system ensures the objectivity and long-term effectiveness of evaluations, forming a course evaluation

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system with a virtuous cycle of development, and meeting the requirements for the comprehensive development of the evaluation subjects. Wang et al. (2022) based on CDIO (conceive, design, implement, and operate) and took the aerospace engineering practical course “Space Navigation Application Project” as an example to conduct teaching reform research from the aspects of teaching content design, optimization of teaching methods, improvement of teaching conditions, and enhancement of assessment methods. Zheng et al. (2023) conducted independent study in the new energy vehicle technology major courses based on the “output based education” concept. Results showed that by training the undergraduates with scientific research projects, a high percentage of the undergraduates who took the independent study obtained offers from famous universities for graduate programs, and the team published high-quality papers.

The above literature show that independent study has attracted much attention in China in recent years, and researchers have conducted research from multiple aspects. However, no work was found to show the differences between the independent study in the United States and China. In the present study, comprehensive comparisons are made between the independent study in the United States and China. Since teaching policies in US universities can significantly vary from one university to another, we would like to take University of Evansville (UE) as a typical example for the United States. Moreover, since the independent study is not offered at many universities in China, we would like to take University of Shanghai for Science and Technology (USST) for instance in China.

Learning Objectives

The policy (implementation method of independent study) at USST provided by the office of academic affairs clearly points out that the faculty integrates scientific research with undergraduate teaching, converting the research content of the research projects into teaching resources for undergraduate courses. Students, through project practice, promote self-study of related courses, thereby enhancing their scientific research literacy and innovation ability (Academic Affairs Office of the University of Shanghai for Science and Technology, 2021).

At UE, the learning objectives of this course are similar to USST. Under the strict supervision of the mentor, through highly individualized academic exploration, students’ critical thinking, complex problem-solving abilities, and academic professionalism are cultivated, ultimately achieving the transition from “acquiring knowledge” to “creating knowledge”. Through this course, students will learn what research is like, and they can gain some research experience to help them evaluate interest in and readiness for future research.

Organization of the Course

The organization of the course is more complex in China than that in the United States. In China, at the very beginning, the independent study course will be evaluated by some experts. First, the qualification of taking this course has some constraints for both the faculty and students at USST. For instance, before the faculty can formally teach this course, the qualifications are required to be evaluated. The faculty must have a project funded by the government or enterprise, meanwhile the project’s start and end dates should cover the course’s start and end dates. This constraint is to ensure that the faculty has research experience and resources, which could be used by students. On the other hand, students who want to formally get the credits of this course need to publish a paper before the formal course is started, which means before the course is formally started, the students should work with the faculty at least for one semester. So normally, before the course is started, although it is advertised to all students in the university, only those who already have research experience with the faculty can get the qualification for taking this course.

This is totally different from that in the United States. In the United States, the independent study courses do not have to be evaluated by experts before being offered. Any faculty who has time and interest can teach an independent study course, which is typically approved by the Department Chair. There can be group projects and individual projects. Larger projects may be offered as 1-3 credits of a “Special Topics” or independent study course. Some departments have specifically titled “Research” where students can earn variable credit. The faculty would advertise the course, and the students would see the description and could contact the faculty to discuss or propose project topics before enrolling in the course. So, it is easier for students to take this course, because they do not need to have a semester’s work with the faculty, or a published paper, before the course starts. Any prerequisites for the course are established by the faculty member offering the independent study. This can vary for each course offering from no pre-requisites, prior coursework, or enrollment limited to “permission of instructor”.

At USST, the credit of this course is fixed at two for every student. However, the course can be 1-3 credits at UE, which depends on the quality and difficulty of the research that the students must do. The credit is decided at the very beginning as the student chooses the course and the faculty approves the level of credit. If the faculty has a small project to work on, they may think that it does not take much time and effort, and less credit is determined. It is noted that the credit cannot be changed after the course begins. In some departments, higher level research can be approved for four credit hours.

Meeting frequency for the students and faculty is slightly different in China and the United States. At USST, every student should come and discuss with the faculty. Normally, once a week, two hours at a time. However, at UE, if the team is big, the students may choose a team leader to attend the meetings, but if the team is small, all the students can come at the same time. During the meeting, the students will report on the work they have done in the past week, what difficulties they met and how they solved them, or if the difficulties are not solved, they may ask for advice from the faculty. At UE, students have additional access to faculty during office hours, where faculty are required to be available for a minimum of 10 hours per week.

Substituting independent study credits of other courses is handled differently at UE and USST. At USST, if the students learn some skills and knowledge during the independent study course, then the course which teaches relative skills and knowledge can be substituted by the independent study course. At USST, the substitute course should be submitted at the very beginning in application stage and can only be one course which has credits no more than that of the independent study course. At UE, it is uncommon for students to be able to substitute these courses for other required courses. The credits usually apply to electives, flexible degree requirements, that allow students to select from a limited set of courses. Students can request a substitution for another course, but it must be approved by multiple levels of faculty and administration. UE and USST have the same requirement that substitutions are limited by the credit hours earned in the independent study course.

Evaluation of Students

To fairly evaluate the students is the final and important step of this course. At USST, it is more like outcome driven evaluation. Students need to publish an article with the faculty and then they can get the credits of this course. The final score of the course is composed of two parts: the regular assessment (50%) and the final oral presentation (50%). At the final stage, students will report what they did during the semester in groups. The regular assessment includes the attendance performance and the performance of completing the work at each stage. At UE, there is usually an oral presentation at the end, and the faculty will evaluate the quality of work and

how well the expectations were met. It is only evaluated by the person who teaches this course, and evaluation methods vary by faculty and course. Assessments can include performance in publishing, an oral or poster presentation, written reports, demonstrations, or other evidence to demonstrate the learning experience.

Conclusions

Comprehensive comparisons of independent study in China and the United States are made from multiple aspects, including learning objectives, organization of the course, and evaluation of students. Main conclusions are drawn as follows:

- (1) The learning objectives of independent study are similar at both USST and UE.
- (2) The qualification of teaching and taking independent study is stricter at USST than that at UE for both faculties and students.
- (3) The credit of independent study is more flexible at UE than that at USST.
- (4) Meeting frequency and the substitution policy of independent study are slightly different at USST and UE.
- (5) The evaluation of students is stricter at USST than that at UE, which focuses more on the publication outcome.

The comparison clearly shows that through independent study; both countries want to improve the students' scientific research literacy and innovation ability. However, there are differences in the details of implementing and executing the course. It is hard to say which one is better than the other, because each country has its own situation and independent study is at different stages of its development. The comparison provides the possibility of improvement of the course.

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