

# A Review of the Research of Practical Activity Curriculum in Chemistry

Lijuan Xie<sup>1,\*</sup>, Yue Ma<sup>2</sup>

<sup>1</sup>Department of Education, Northwest Normal University, Lanzhou, Gansu, China.

<sup>2</sup>Linxia No.2 Middle School, Linxia, Gansu, China.

**How to cite this paper:** Lijuan Xie, Yue Ma. (2023). A Review of the Research of Practical Activity Curriculum in Chemistry. *The Educational Review, USA, 7(3)*, 385-389.

DOI: 10.26855/er.2023.03.020

**Received:** February 28, 2023

**Accepted:** March 26, 2023

**Published:** April 25, 2023

**Corresponding author:** Lijuan Xie, Department of Education, Northwest Normal University, Lanzhou, Gansu, China.

---

## Abstract

The practical activity course of chemistry is a new form of chemistry teaching and reform, which conforms to the new curriculum standard of chemistry in basic education, the new textbook of chemistry and the idea of the new college entrance examination evaluation system. It is an important way to develop students' core quality and improve teachers' professional ability. Through literature research, the connotation, basic elements, characteristics and design framework of discipline practice activities are clarified. Subject practice curriculum belongs to integrated practice curriculum, which is a unique form of Chinese curriculum. Through analyzing the related research of integrated practice curriculum and other subjects, the author extracts the general ideas and methods of constructing practical activity curriculum. By summarizing the differences and connections between comprehensive practice curriculum and discipline practice curriculum, this paper provides theoretical and practical reference for the design and implementation of chemistry practice curriculum in the curriculum development community.

## Keywords

Curriculum, Curriculum chemistry, Practice activities, Chemistry practice activities, Research review

---

Through the "CNKI China Excellent Doctor and Master Thesis Full-text Database" and "CNKI China Journal Full-text Database", search materials by the topics of "Practice activity course of Chemistry" and "Practice activity course of Chemistry", through the classification and analysis of the title, abstract and keywords of the core literature, the relevant research of practice activity course of chemistry mainly includes the following parts:

## 1. Connotation of discipline practice

Integrated practice activity course is our unique course type, which belongs to the national required course. In this paper, the practical activity course of chemistry discipline belongs to the discipline practice in the integrated practice course, so this paper mainly reviews the research status of the practical activity course of chemistry discipline.

Some domestic scholars construct discipline practice curriculum from the perspective of curriculum definition, curriculum value, curriculum characteristics, curriculum construction objectives, curriculum content and implementation, and teacher role transformation. They believe that discipline practice curriculum is subordinate to the national curriculum and focuses on activity curriculum. Its role is to integrate the activity curriculum and subject curriculum that used to be opposite. The curriculum value of discipline practice is embodied in penetrating value education, strengthening the cultivation of five abilities and cultivating comprehensive quality. The curriculum of discipline practice activity has

the characteristics of comprehensiveness, practicality, openness, inquiry, production and academic (Zhu Chuan-shi, 2016, pp. 44-47).

The basic elements of discipline practice include "subject of discipline practice", "object of discipline practice", "need, purpose and tool of discipline practice", "behavior and operation of discipline practice" and "result of discipline practice". From the three aspects of activity scope, activity orientation and activity mode, discipline practice can be divided into three categories: class hour, unit and cross-unit discipline practice. The discipline practice activities with the orientation of learning before applying, applying to learning and integrating learning with application; As well as practical activities of hands-on operation, experience and understanding, and design and creation. The researchers set up a framework of discipline practice activity design from five aspects, namely, activity goal, activity content, activity mode, activity process and activity level (Yao Ru, 2021, p. 75).

## 2. Research on practical activity courses of Chemistry

Some researchers have carried out a study on the design and implementation of junior high school chemistry practical activity course. The results show that carrying out subject practical activity course can improve students' practical ability and cultivate students' innovative consciousness. At the same time, it also points out that there are two main problems in the practical activities of junior middle school chemistry. First, the practical activities of many schools are mere formalities and do not reach the relevant provisions in the curriculum plan. Second, teachers lack the knowledge of the subject practice curriculum and the ability to carry out the subject practice curriculum and teaching (Shi Mingyue, 2020, pp. 57-58).

Some Chinese scholars have pointed out that chemistry learning activities should correspond to knowledge types: students can perceive, accept, understand and remember the factual knowledge about substance composition, structure and property changes in middle school chemistry courses, and consolidate the knowledge through practice and simple application in "understanding middle school". Knowledge about chemical research methods and learning strategies requires students to analyze and explore new problems and new things in the way of scientific inquiry, master the methods of scientific inquiry, learn new knowledge through exchanges and discussions, summarize and reflect, and solve new problems, which is "learning by doing". The learning of the subject's ideas and values requires the experience, reflection, perception and recognition in the process of acquiring the core knowledge and methods of chemistry, which is the learning activity of "Wu Middle School" chemistry course.

Design chemistry learning activities from diverse perspectives. Depending on the subject of chemistry study, some activities can be completed by individual students, such as the study of simple concepts and factual knowledge; Some activities can also be organized and carried out by student groups, such as experimental exploration of chemical principles. Exploratory learning activities can design or organize specific learning activities to be completed around the exploration of a certain problem and the completion of a certain task, including the content, form, operation process and results of the activities. Design learning activities according to students' actual level. Learners can use the existing basic knowledge and cognitive ability, through their own efforts and cooperation between learning partners, as well as the teacher's guidance and help, to solve the problem smoothly. Learning activities should also be challenging, which can trigger students' higher thinking activities. A unit often contains a number of different learning activities, which have different requirements and complexity. The activity design should reflect the hierarchy and present the recursive arrangement (Wang Yunsheng, 2016, pp. 3-6).

Chemical experiment is the carrier of scientific inquiry. For a class, a variety of different knowledge is involved, and different student activities are often interrelated and integrated together. Experimental inquiry is the most commonly used activity in chemistry teaching. It can reveal complex and abstract chemical concepts through the analysis and reasoning of different phenomena in the experiment. Middle school chemistry experiment teaching is not only the best practical activity to learn the knowledge and skills related to the properties and changes of substances, the preparation and synthesis of substances, but also the activity process in which students give full play to their imagination and creativity. In the process of experimental exploration, students can use their brains to design and operate according to the objectives of experimental tasks, fully feel and experience the generation process of chemical knowledge, reason and demonstrate based on evidence, and cultivate students' innovative consciousness and critical spirit in combination with "abnormal phenomena" (Wang Zuhao, 2019, p. 234).

## 3. Relevant research on practical activity courses of other disciplines

Participating in high school biology practice activities can well improve students' innovative thinking ability, cooperative communication ability and logical thinking ability. At the same time, students' ability to collect, summarize and summarize information is also greatly improved (Zhao Siyang, 2015, pp. 30-36). Common types of biological practice

activities include theme exploration, application production, visit and investigation, compound practice, etc. Different types of practice activities are implemented according to different strategies and steps (Lin Qifeng, 2013, pp. 39-45). Some researchers have elaborated the function and value of biology practice activities in biology course learning, and put forward effective strategies and suggestions to carry out biology practice activities.

Under the guidance of teachers, students carry out various forms of rich and colorful practical activities in physics, and study some problems in the activities. Physics practice and physics curriculum complement each other to achieve the goal of developing students' core literacy (Zhao Wei, 2000, p. 1).

In 2015, the curriculum plan of compulsory education in Beijing took the lead in setting up the course of "open scientific Practice activities". Discipline practice is the highlight of the new curriculum standard of compulsory education (Yu W S., 2022, p. 14). The new curriculum standard of compulsory education requires that the class hours of practice activities of each discipline should not be less than 10% of the total class hours of the discipline, and the curriculum standards of ordinary high schools advocate the practice activities within or across disciplines. The four links to effectively promote the implementation of open science practice curriculum are: learn to choose, and better "choose the course guidance course"; Hands-on practice, do a good job in the "field practice class"; Share with each other, pay attention to the "results show course"; Two-way promotion, organizing "subject regression course" (Yang Zhicheng, 2016, pp. 40-41).

The development of high school geography practice curriculum should follow the principles of theme, project, question and feasibility. Through the research, the author puts forward the following points of emphasis in the course of field practice: to clarify the content and requirements of course development; Excavate and optimize localized geography curriculum resources; Constructing the evaluation system of geography practice course; Strengthening the construction of curriculum development groups; Optimize the environment for practical curriculum development (Zeng Ye, 2019, p. 32).

There is also a small amount of research around STEM education and activity curriculum. Some researchers designed and implemented the biology activity course titled "Healthy Life" under the STEM education concept in junior middle school. The results showed that students' STEM literacy level was improved through the study of biology STEM activity course. This is specifically reflected in the following aspects: students' cooperation and communication ability, scientific inquiry ability, problem solving ability and practical innovation ability have been improved in STEM course learning, especially the intrinsic learning motivation and lasting interest of students in biology learning (Yuan Xuerong, 2020, pp. 65-66).

The core element of the comprehensive practical activity course based on the STEAM concept is to train students to have optimized and iterative engineering thinking, which makes students' design schemes more reasonable, processes clearer, conclusions more scientific, and works more novel (Xu Li-mei, 2018, pp. 21-23). There are many researches on the practical activities of political discipline. For example, some researchers propose to carry out practical activities of ethics and rule of law discipline in order to highlight the moral education function of the discipline and promote the improvement of teaching methods. Some researchers have applied the concept of reverse design to the course teaching of ideological and political activities in high school. In addition, there are also Chinese comprehensive practical activity curriculum, English comprehensive practical activity curriculum, mathematics comprehensive practical activity curriculum related research.

#### 4. Research Review

To sum up, there are both connections and differences between discipline practice curriculum and comprehensive practice curriculum. In essence, both are practical activity courses. It can be seen from the relevant research of practical activity curriculum that the construction of practical activity curriculum model generally consists of the following stages: creating the problem situation; Propose solutions; Hands-on practice improvement; Sharing original work; Improve the design of the work; Reflection on multiple evaluation.

The connection between disciplinary practice curriculum and comprehensive practice curriculum is mainly manifested in the following three aspects: First, both comprehensive practice curriculum and disciplinary practice curriculum emphasize comprehensiveness and application, transform real situation problems into activity themes, and develop students' core literacy through scientific inquiry, experiment, investigation and research, design and production, experience and other ways of interdisciplinary practical courses. Second, from the perspective of curriculum development, the integrated practical activity curriculum and the subject practical activity curriculum have much in common in the aspects of curriculum development concept, curriculum goal determination, curriculum content selection and organization, curriculum implementation, curriculum evaluation and so on, and can learn from each other. Thirdly, both discipline practice activities and comprehensive practice activities emphasize that students should solve problems in real situations,

learn the necessary knowledge of various disciplines, master the ideas and methods of scientific inquiry and problem solving, improve key abilities and develop students' core qualities.

There is also a difference between discipline practice and comprehensive practice, which is mainly manifested in the denotation and name of the concept. On the one hand, the extension of comprehensive practice is more extensive than that of disciplinary practice. The integrated practical activity course is an important part of the curriculum system of basic education. The newly revised compulsory education curriculum plan and curriculum standards of all disciplines have improved the content structure of the curriculum, requiring that "interdisciplinary theme" learning activities should be set up for the purpose of developing students' core literacy, and that at least 10% of the class hours of all disciplines should be devoted to courses of discipline practice activities, emphasizing the interdisciplinary, comprehensive and practical nature of the curriculum. There are similar provisions or requirements in the high school curriculum programs of provinces and cities. It can be seen that the subject practice curriculum belongs to the comprehensive practice curriculum. On the other hand, from the perspective of the name, the subject practice activity courses of Chinese, mathematics and foreign language are called "comprehensive Practice activity course of Chinese", "comprehensive Practice Activity course of Mathematics" and "comprehensive Practice Activity course of English". There is no word "comprehensive" in the name of such courses of other subjects. It is usually referred to as "Chemistry practice activity course" and "Physics Practice activity course". The researchers believe that this is related to the nature of the discipline, Chinese, mathematics, English three subjects than chemistry, physics, biology and other professional disciplines, has a strong comprehensive.

In recent years, the information about integrated practice courses has presented the momentum of rapid development. There are more theoretical research and less empirical research, but the research data about the practice courses of the discipline is less and the empirical research on the practice courses of the system is even less. The research on practical activity course of chemistry is very scarce.

The practical activity course of chemistry belongs to the comprehensive practical activity curriculum system and is rooted in the curriculum standards. It means that under the guidance of the literature-oriented learning goal, students focus on the real situation, carry out the challenging scientific inquiry and other practical activities focusing on chemical experiments, and advocate the transformation of knowledge into literacy in the form of practical activities. In practical activities, students are fully committed to understanding that the combination of macro and micro and conservation of change are the characteristics of chemistry. They form the thinking mode of evidential reasoning and model cognition, construct the knowledge system, master the thoughts and methods of problem solving, develop scientific thinking, improve the ability of problem solving and cooperation, and form positive learning motivation, internalized scientific spirit and social responsibility. Be the master of future social practice who can learn, cooperate, take responsibility and be responsible. The practical activity course of chemistry conforms to the new curriculum standard of basic education chemistry, the new textbook of chemistry and the new evaluation system of college entrance examination, which is conducive to improving the core quality of chemistry and developing the core quality of students.

## References

- Lin Qifeng. Development and implementation of school-based curriculum of Biology and environmental Practice Activities in junior middle school [D]. Guangzhou: Guangzhou University, 2013:39-45.
- Shi Mingyue. Study on design and implementation of Practical activity course of junior high School Chemistry [D]. Shenyang: Shenyang Normal University, 2020:57-58.
- Wang Yunsheng. Exploring the Design of Classroom Learning Activities to Implement the Requirements of Core Literacy Training [J]. Chemistry Teaching, 2016(9): 3-6.
- Wang Zuhao. Curriculum Standard of Ordinary High School (2017 edition, 2020 revision) Teacher Guidance (Chemistry) [M]. Shanghai: Shanghai Education Press, 2019:234.
- Xu Li-mei. Construction of Comprehensive Practical Activity Curriculum guided by STEAM Concept [J]. Teaching and Management, 2018 (11): 21-23.
- Yang Zhicheng. Selection, Doing, Exhibition and Returning: Suggestions on the implementation of the "Open Science Practice Activity" course in four links [J]. Learning and Teaching, 2016(6): 40-41.
- Yao Ru. Research on the design of Discipline Practice Activities pointing to Big Concepts [D]. Chengdu: Sichuan Normal University, 2021:75.
- Yu W S. The value of discipline Education and Discipline Practice: Two Highlights of the New Standard of Discipline Curriculum [J]. Global Education Perspectives, 2022(4): 14.

- Yuan Xuerong. Design and Practice Research of Middle School Biology Activity Curriculum under STEM Education Concept [D]. Harbin: Harbin Normal University, 2020:65-66. (in Chinese)
- Zeng Ye. Research on the development of high school Geography practice curriculum in S Middle School of Chengdu [D]. Nanchong: China West Normal University, 2019:32.
- Zhao Siyang. Effectiveness Evaluation and Innovation Ability Cultivation of High school Biology Practice Activities [D]. Dalian: Liaoning Normal University, 2015:30-36.
- Zhao Wei. Primary Exploration of "Physical Practice Activities" in Junior high School [J]. Subject Education, 2000(11): 1.
- Zhu Chuan-shi. Comprehensive Construction of Discipline Practice Curriculum [J]. Beijing Education, 2016:44-47.