Chapter 5
How to Design a Course Category of School-Based Curriculum

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The school-based curriculum framework of a school often consists of multiple course categories. These categories are focused and interrelated; they all point toward the overarching goals of the school curriculum. These categories are connected to the overall curriculum of the school while maintaining distinctive characteristics. Even if these categories of courses are grouped together, there is no strict logic among the courses with similar categories. The design for a category of courses reflects all aspects and elements of the school-based curriculum; it can be seen from the overall form of the school-based curriculum development. In this chapter, we will describe a category of school-based courses: the school-based development of the imagination and creative category of courses. From this, we will be able to see that the curriculum objectives are consistent, the curricular contents are similar, and that the courses have similar organization and assessment methods as others within the same category. We can also see where the category is positioned within the school's hierarchy of courses as well as the step-by-step design process.

5.1 Case Background

5.1.1 School History

The Xishan Senior High School of Jiangsu Province, the school at the center of this case, is a suburban school. It is located in Huishan District, Wuxi City, Jiangsu Province, in the economically developed Yangtze River Delta Region of China. The

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school was founded in 1907, and consists of a regular high school and an international department. It has more than 2300 students and 235 full-time teachers. The school recruits junior high school graduates with an excellent performance from a population of 400,000 in the Huishan District. The campus covers an area of 415 acres, and the school building area is 120,000 m^2. The school has some fitness facilities, such as a fencing hall with 20 standard fencing lanes, indoor and outdoor swimming pools, and many others. The school is often considered to be the "county high school," that is, a particularly good school in the county. There are more than 2800 counties in China. Therefore, schools at this level are representative of schools across the nation.

5.1.2 Path of School-Based Curriculum Development

As early as the 1920s and 1930s, the school was able to implement "course tailoring" according to its condition and in accordance with the standards set by the government. The founder of the school, Kuang Zhongmou, proposed that "when one enters the high school, one studies freely, develops individually, and cultivates practical talents."(Kuang)Xishan Senior High School has always been humanistic, learning-centered, and focused on personality development. The curriculum has been made to be as suitable as possible for the development of students in the school, thus enhancing the relevance and effectiveness of the curriculum.

In 1996, then-president Zhu Shixiong, together with a team of experts led by Professor Shi Liangfang and Dr. Cui Yunhou from the East China Normal University, systematically introduced the theory of school-based curriculum. Director Tang Jianghu of Xishan Senior High School and other important members of the school repeatedly tried and reflected on the theory, which helped to initially answer fundamental questions such as "what is school-based curriculum in China?" and "how should a school-based curriculum be offered in China?" They explored the basic process flow for school-based curriculum development, operational norms, management models, assessment methods, and other such aspects. They then created the "School-based Curriculum Planning Program (1997)"; this was the earliest completed school-based curriculum development in China.

The school-based curriculum in the early days of Xishan Senior High School mainly provided elective courses and activity classes according to the development needs of the students; attention was paid to the functions and values of supplementary teaching such as "Reading Skills," "English Listening," "Wu Culture,"[1] "Research-based Learning Methods," and "Psychological Counseling." The exploration of this issue led to the development of the Chinese school-based curriculum. Professor Cui affirmed the pioneering work of this curriculum, and he thought that

[1]Wu culture was A traditional Chinese culture. https://baike.baidu.com/item/%E5%90%B4%E6%96%87%E5%8C%96/7481274?fr=aladdin.

Xiashan Senior High School added the above elective courses and activity classess on the basis of the original compulsory courses. Those works were a landmark progress in the history of Chinese school curriculum (Cui, 2002).

In 2000, the Ministry of Education promulgated the "Full-time General Senior High School Curriculum Program (Revised Experiment Draft)," which divided curriculum planning in high schools into subject-based courses and activity-based courses. At this time, Xishan Senior High School had carried out 5 years of school-based curriculum development and exploration. The implementation of curriculum planning in the high school made the school-based curriculum development of Xishan Senior High School transition from the initially simplistic "activity classes" and "elective courses" of school-based experiment progress toward the true meaning of "school-based curriculum."

In 2005, Jiangsu Province fully implemented curriculum reform in all its regular high schools. The new curriculum plan in high schools had an overall impact on the school-based curriculum system under the framework of the original curriculum planning framework of Xishan Senior High School. For this reason, Xishan Senior High School, under the theoretical guidance of the team led by professor Cui, re-planned and re-developed its school-based curriculum, which resulted in a school-based curriculum system corresponding to Elective II and the national curriculum structure.

The exploration and implementation of the school-based curriculum of Xishan Senior High School had a clear curriculum plan and framework, standardized development process, management model, and teacher admission system. According to its founding documents that the school-based curriculum of Xishan Senior High School emphasizes practicality, flexibility, and service-oriented curriculum practice management, a curriculum mindset with extensive student involvement and curriculum development, and experiential, active, and expressive learning methods (Cui, 2002). It advocates curriculum development with teamwork and implements performance assessment and various assessment schemes. Xishan Senior High School's school-based curriculum development has become a model for basic education curriculum development across China. In the "Findings from Mainland China on research on senior school curriculum syllabus" from the "Research on the development of high school curriculum in major countries of the world • final report," (Li, Huang, Cai, Xu, et al., 2001) Xishan Senior High School's school-based curriculum planning program was introduced, the school was identified as the "birthplace of school-based curriculum development in Mainland China." (Li et al., 2001).

Curriculum planning program of Xishan Senior High School in Jiangsu Province

In 2009, Xishan Senior High School completed a significant adjustment to its curriculum structure; the resulting structure is shown in the figure below (Table 5.1).

Table 5.1 Jiangsu Xishan Senior High School curriculum planning program

Learning area	Subject (credit)	Compulsory	Elective I	Elective II	
Language and literature	Language (14)	1-5[a]	Series 1; Series 2; Series 3; Series 4; Series 5	Category	Course category (credit requirements)
	Foreign language (14)	1-5	Series 6-11		
Mathematics	Mathematics (14)	1-5	1-1; 1-2; 2-1; 2-2; 2-3; 4-2; 4-3; 4-4; 4-5		
Humanities and society	Politics (12)	1-4	Elective 3		
	History (10)	1-3	Elective 1; Elective 4	Limited elective 12	Imagination • Creativity (9)
Science	Geography (10)	1-3	Elective 2; elective 6;		Foundation for entrepreneurship (3)
	Physics (10)	1-2	3-1; 3-3		
	Chemistry (10)	1-2	1. Chemistry and life; 3. Material structure and nature 4. Principles of chemical reactions; 5. Fundamentals of organic chemistry	Optional class elective 3	University prerequisite (1)
					Social aspect (1)
					Science and technology frontier (1)
					Skills and hobbies (1)
	Biology (10)	1-3	1. Biotechnology practice; 2. Biological science and society 3. Modern biotechnology topics		Psychological education (1)
Sports and health	Sports and health (11)	1. Health	Options: basketball, volleyball, table tennis, aerobics, football, badminton, track and field, fencing, swimming, tai chi, yoga, tae kwon do		

Comprehensive Practice	Community service (2)	Nursing home service learning	Library services, caring home services, laboratory services, Kuang Yuan TV services, school history lecturers, etc.		
	Social practice (6)	Military training, social practice-based activities	Simulate cities, search for hometown history, and examine new urban and rural changes, such as self-selected social practices		
Technology	IT-based research learning (19)	Research study 1-5			
		Information technology foundation 1	Elective 3: Network technology applications		
	General technology (6)	Technology and design 1			
Art	Art (6)	Art appreciation			

Note: The parts in the table indicated by the numbers 1 to 11 refer to the module numbers in the course standards of the subject.
[a]1-5 show that the 1-5 module numbers in the course standards of the subject

5.1.3 Development of Course Category

In the fall of 2011, in order to improve the quality of the course and expand the scope of the class, Principal Tang Jiangpeng, on the basis of the national curriculum standards, proposed a unified school-based curriculum with a credit system, art courses and technical courses, and the creative implementation of national and local curriculum plans.

At the same time, the curriculum development team of Xishan Senior High School also found that a lack of imagination and creativity is a common problem high schools currently face. One of the reasons for this is the lack of specific ways that schools cultivate the imagination and creativity of students. The following were determined to be problems that need to be addressed:

- There was a lack of specific courses that directly cultivate the imagination and creativity of students.
- The school lacked learning environments that allowed students to "actualize their imagination" such as workshops, design centers, and other specialized facilities.
- It was difficult to cultivate the imagination and creativity of students using traditional teaching methods; it was necessary to change the teaching styles used.
- The school lacked suitable curriculum development and implementation mechanisms.

To solve the above problems, Xishan Senior High School developed a separate series of courses under the imagination • creativity school-based curriculum and integrated it into the overall school-based curriculum structure of the school. This category of courses is positioned within the Electives II and Limited Electives modules.

5.2 Planning and Design

5.2.1 Planning of the Imagination: Creativity School-Based Curriculum

5.2.1.1 Guidance Documents and Curriculum Policies of the Competent Education Authorities

In 2003, the "Regular High School Curriculum Plan (Experiment)," promulgated by the Ministry of Education, noted that schools should be given reasonable and sufficient curriculum autonomy so that they can creatively implement the national curriculum, develop the school curriculum according to local conditions, and guarantee that students will be able to choose their courses effectively.

5.2.1.2 Sorting Through the History of the School and Further Clarifying the School's Educational Philosophy

In the 15th year of the Republic (1926), the school determined the "Ten Major Training Objectives," namely: "exercise to have a healthy and strong body, cultivate virtue of unity in words and deeds, cultivate the moral principle of integrity toward the public, inspire the spirit of sacrificing the self for the country, advocate obedience to the team, train to gain the courtesy of being humble, respectful, and gentle, develop a sensitive and sophisticated mind, practice the skills of increasing production, foster habits of diligence and endurance, and promote a lively and pleasant attitude."[2] Today, the school has followed the spirit of the times and considered the development needs of modern-day people to sum up the school's current educational philosophy as "strong life, noble spirit, excellence in wisdom, and emotional fullness." The imagination • creativity category of courses mainly focuses on cultivating students with "excellence in wisdom" and "emotional fullness."

5.2.1.3 Evaluate the Students' Curriculum Needs and Understand the Curriculum Areas That Students Are Concerned About

The school evaluated the students' curriculum needs, which can be seen in the figure below, showing the data of the students' curriculum needs in specific fields. For example, most students need courses in the fields of "technology and innovation" (56.09%) and "comprehensive art" (42.81%). This provides a realistic basis for the development of the imagination • creativity curriculum (Fig. 5.1).

5.2.1.4 Analyze Regional Characteristics to Understand Local Curriculum Expectations

Huishan District, where the school is located, is situated in the economically developed Yangtze River Delta Region of China. The economic development has gradually changed the people's understanding of the value of education and their expectations toward education. According to survey data, parents in the Huishan District and local representatives associate the following words with their expectations toward school education: happiness, social responsibility, physical and mental health, and cooperative spirit.

[2]Wuxi Private Village Junior High School. School regulations • teaching standards and methods [A]. 30th Anniversary Issue of Wuxi Private Village Junior High School [C], 26th year of the Republic (1937).

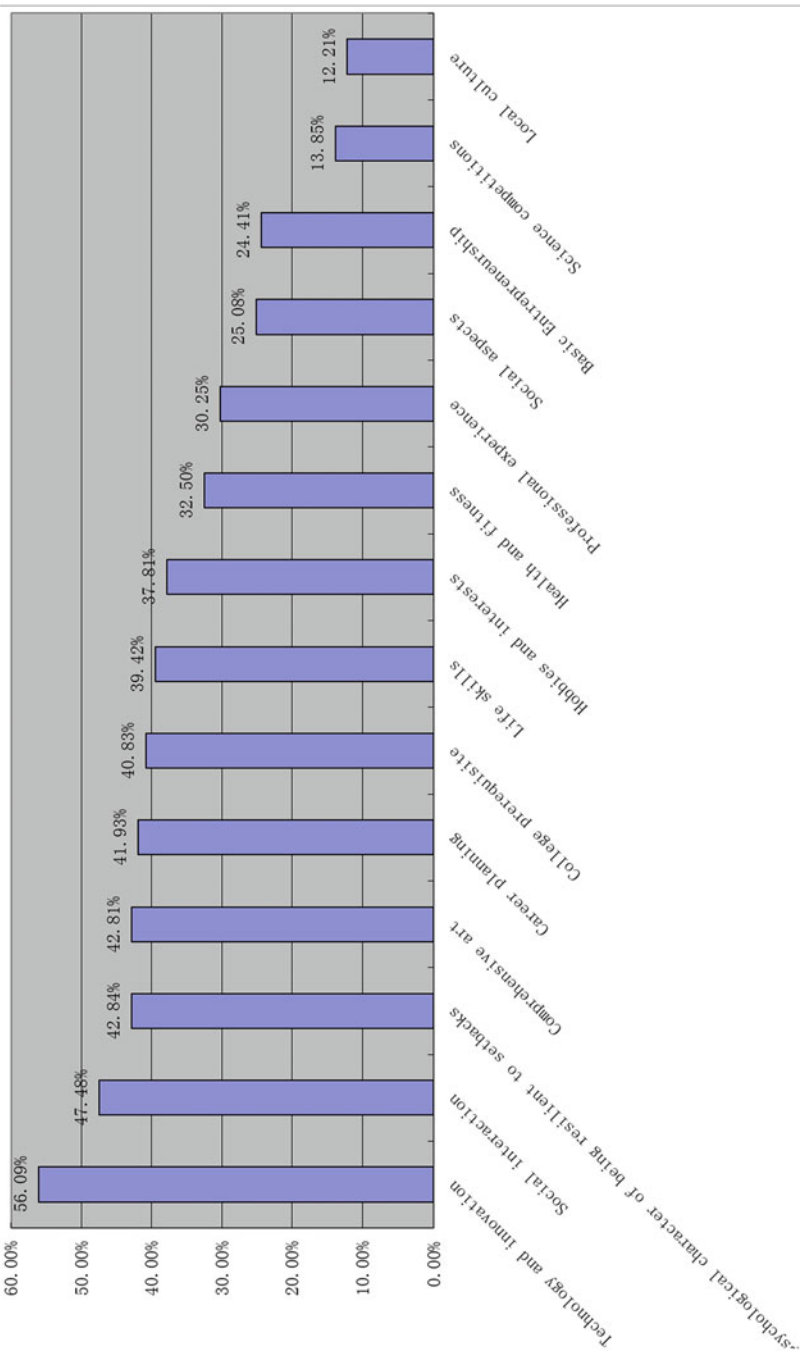

Fig. 5.1 Students' curriculum needs by field

5.2.1.5 Analyze School Curriculum Resources Based on Objective Conditions

With more than 10 years of curriculum construction, the school has formed a relatively sound and smooth management system that guarantees the implementation of curriculum management. The school has a large number of teachers with extensive curriculum development and implementation capabilities and nearly 30 dedicated functional classrooms related to art and technology. These provide the necessary resource guarantee for imagination • creativity courses.

5.2.2 Curriculum Objectives

The development of the category of "Imagination • Creativity" school-based curriculum began in 2009. Under the guidance of the thought "Design is the Rhetoric of a new Technology Culture" by Professor Richard Buchanan, former president of the World Design Research Society and head of the Carnegie Mellon School of Design, courses on technology, art, physics, and research study were fused together. The subject content was extracted, and the imagination • creativity category's school-based curriculum was designed; the overall curriculum objective of "integrating science and art, creating in imagination" was established. To learn through these courses, students must skillfully use one tool language, make one material piece of work, record one engineering journal of no fewer than 20 pages, and write one research paper of no fewer than 3000 words. The objectives of these courses are derived from the school's overall curriculum objectives, which are:

- Cultivate engineers with superior intellect, strict thinking, good practice, insight into creation, technical norms, and dedication; and
- Cultivate emotionally full designers who love life, are passionate, are creative, appreciate beauty, and are loving.

5.2.3 Curriculum Content

To enhance the students' imagination and creativity and to cultivate critical thinking and divergent thinking, one of the important technical paths is to improve the students' hands-on and performance abilities to provide them with the vehicle to "actualize their imagination."

The design of the curriculum content has two considerations. First, starting from the high school's existing disciplines, the designers must select content from the fields of information technology, general technology, art, and physics, in order to make the curriculum design suitable for the cognitive level of the students and their academic study. Second, the courses must be matched with offerings from

universities. The curriculum content referred to industrial design, fashion design and engineering, aircraft design and engineering, landscape architecture design, microelectronics, mechanical engineering manufacturing and automation, computer science and technology, roads and bridges, architecture, and other undergraduate majors offered by Chinese universities in order to link the students' learning with their career plans, thereby making it a meaningful attempt toward discovering their potential careers.

The imagination and creativity of students often occur in the intersection, edge, or comprehensive zone of subjects. Therefore, the design of the curriculum content should try to surpass individual disciplines and develop comprehensive courses; the content generally covers two or more disciplines. For example, the development of the integrated and multi-disciplinary "Micro-movie" course includes script writing (languages), photography (general technology), video editing (information technology), and art design (art). The development of the "industrial design" course, through its interdisciplinary learning, involves using tools to assist in creating and stimulating the imagination. The development of the "clothing design and performance" courses involves students using sewing machines to make clothing and using shapes to display clothing; beauty becomes tangible and expressive.

In this way, the school developed "Open Source Hardware Maker," "Robot Design and Production," "Electronic Design," "Inventive Innovation Methods," "UAV Design and Production," "Clothing Design and Performance," "Bridge Design," "Architectural Model Making," "Micro-movie," "Industrial Design," "Illustration Design," "Creative Design in Life," "3D Printing," "Computer Programming," and for a total of close to 20 courses to form the imagination • creativity category (Fig. 5.2).

5.2.4 Curriculum Implementation

The curriculum implementation is aimed at cultivating the imagination and creativity of the students. For example, if a teacher teaches students to imitate, the charm of the course will be lost, students will have no space to imagine, and there will be no motivation to create. If the teacher takes on a free-range approach, students will face many obstacles, and their frustration will undermine their motivation for learning. To this end, the school learned from the experience of the social and economic fields as well as from business incubators to manage the curriculum and organize the classrooms. The mechanism of incubated learning was designed on the basis of examining the technology business incubator (Fig. 5.3).

The incubator consists mainly of three support systems. Each functional classroom is transformed into a workshop where technical guidance and course services are provided, and facilities and equipment in the classroom are available for students to register to use. The incubation manager of the class is the teacher, who is responsible for forming a team of teachers and students to demonstrate whether the students' project is feasible and to use professional methods to judge the

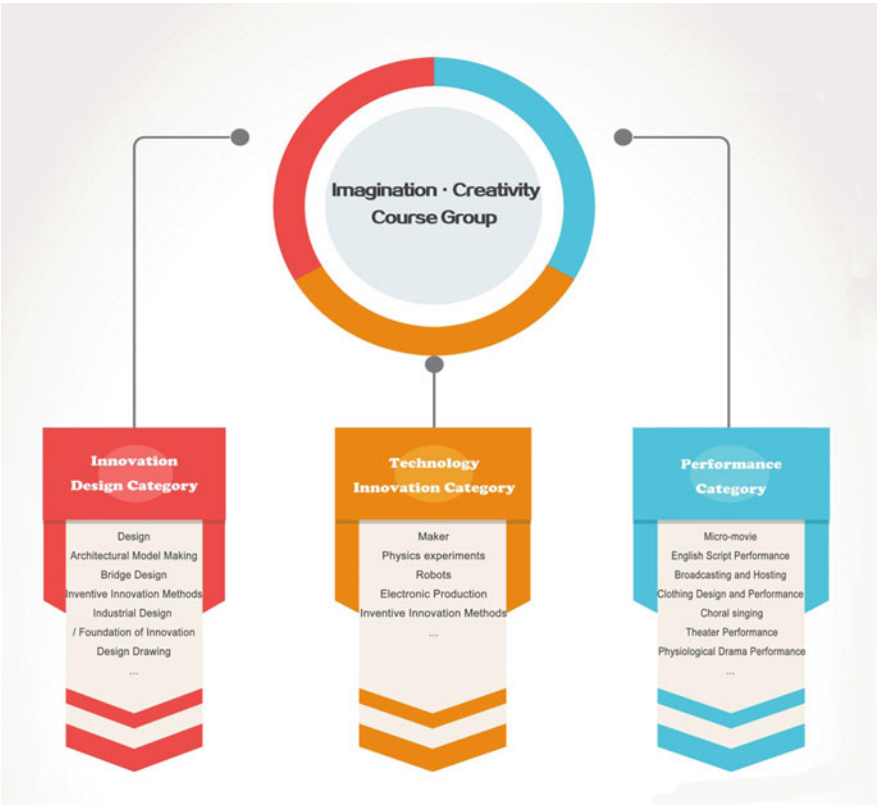

Fig. 5.2 Content structure of imagination • creativity school-based curriculum

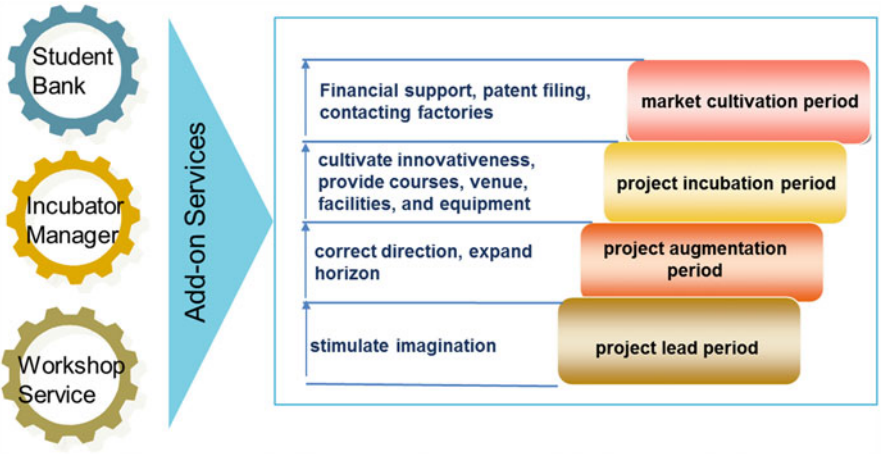

Fig. 5.3 Flowchart of project incubated learning

scientificity, feasibility, and innovation of the project as well as to provide guidance. The student-managed "Student Bank" can provide students with interest-free business loans to support the equipment that they need to purchase. Projects with a particularly high score in a previous project review can also apply for venture capital investment from the bank to fund the incubation of the project.

Project incubation mainly goes through the following four processes:

Stage I. Project lead period

Students learn basic knowledge and skills, then find real-world problems and creatively propose solutions. Students should learn basic knowledge, practice basic skills, and learn to write project plans and undertake implementation.

Stage II. Project argumentation period

The students' developing projects are continuously improved under the guidance of the teachers. They are reviewed by the incubator manager (teacher) and the incubator project screening committee (teacher–student group) in order to enter the project incubation period. During this period, students fill out a draft of the project design report, and after group discussions, combine their ideas and improve the project. Teachers should also use case to explain this theory and provide targeted and individualized guidance to students.

Stage III. Project incubation period

Students will learn the necessary knowledge in workshops and improve upon their practical abilities. Teachers provide knowledge and technical guidance for this project. When the students' project needs funds (From bank), they can apply for "campus venture capital" and financial support from the "student startup bank" until their project is completed.

Stage IV. Market cultivation period

This part is also the stage of student assessment. Students are assessed through three dimensions: materialized works, engineering journals, and research papers. Services such as competition entry guidance, patent filing, and the contacting of factories are provided from teachers for particularly outstanding projects. Each project needs to have pieces of work, journals, and papers submitted in addition to the students giving project presentations. Teachers and students will assess the course learning accordingly.

5.2.5 Curriculum Assessment

The school-based curriculum for the category of "imagination and creativity" courses relies on the integration of multiple disciplines, using multi-disciplinary learning methods such as practice, inquiry, and experience. Therefore, the curriculum assessment is mainly done through performance assessment that covers multiple disciplines.

For example, the assessment of the "Engineering Science Innovation" course requires students to be able to use one tool language, make one material piece of

Table 5.2 Assessment of "Industrial Design"

Assessment item	Assessment method	Percentage (%)	Score
Cooperative division of labor and performance	Teacher assessment, assessment within the group	20	
Group study kits, including group design and production plan texts, photos, design sketches of various units, mind maps, etc.	Teacher assessment	10	
Group presentation and work report	Teacher assessment, assessment within the group	20	
Work score (integrity, function, material, form, efficiency, performance, esthetics, ingenuity, etc.)	Teacher assessment, peer assessment	50	

work, record one engineering journal, and write one research paper; the students will be assessed along these four dimensions, described below.

Be able to use one tool language: Students must be able to use a programming tool to write an open source hardware control. Directed toward computational thinking.

Make one material piece of work: Students should use a tool such as a lathe, clamp, mill, plane, or grinder, along with technology such as laser cutting or 3D printing, to make a tangible, innovative, or interactive media piece of work. Directed toward materialization ability (general technology) and artistic creativity expression (art).

Record one engineering journal: Students must draft, record processes, and work as engineers. Directed toward pattern expression capabilities (general technology) and engineering thinking (general technology).

Write one research paper: Students will express thoughts in an academic language and present research in a standardized chart. Directed toward the ability for research-based learning (Hu, 2017).

As another example, the assessment of the "Industrial Design" course focuses on the learning process as shown in the table below (Table 5.2).

5.2.6 Mechanisms

5.2.6.1 Develop a Curriculum with a Large Resource Perspective and Establish a Multi-Disciplinary Curriculum Cooperation Development Mechanism

Junior high school teachers are limited by their academic backgrounds. When developing a curriculum, their vision may not be broad enough, resulting in a curriculum with inadequate professionalism. To this end, Xishan Senior High

School worked with universities, research institutes, and high-tech companies to develop courses. For example, the developed "Industrial Design" course is professionally oriented. It involves psychology, sociology, esthetics, ergonomics, mechanical construction, photography, color science, and other forms of knowledge. For this reason, our school developed the course in conjunction with Jiangnan University School of Design and the University of New South Wales School of Architecture and the School of Humanities and Arts. University teachers and foreign teachers developed the "Design Courses" based on the school to create a model industrial design education center. We also implemented a "Reverse Feeder" program to establish a return-to-school teaching mechanism for college graduates. For example, Xie Chao, winner of the Science and Technology Innovation Governor Award, returns to the school from the university every week to conduct the "Electronic Production" class. The plan of "Replace courses with resources." It means that the school's venue and facilities are rented out to companies for free, and in turn, the companies send professional technicians to teach. The plan of "Buy course services." It means that the school purchases high-quality courses.

5.2.6.2 Starting from Practice, Develop Standards for the Construction of Dedicated Classrooms with Independent Intellectual Property Rights

The implementation of the course requires protection from the surrounding environment. The functional classrooms in the school have been completely created and led by businesses; practicing teachers have had no input. Xishan Senior High School adopted the idea of "start with development curriculum then build the classroom" and followed the idea of "developing curriculum—curriculum practice—demand analysis—learning from experience—independent research and development" while focusing on "me." The front-line teachers have developed more than ten sets of classroom construction standards including industrial design classrooms, film workshops, maker spaces, fashion design centers, and creative workshops.

These functional classrooms integrate the functions of workshops, exhibition halls, classrooms, resource libraries, and teacher studios. For example, the "Electronic Design Room" includes not only basic processing equipment such as electric soldering irons but also supplies cabinets and semi-finished products storage areas, which are used in daily teaching. There will also be a book borrowing area where related books and magazines from the library will be placed for the students to use freely. In addition, there is a teacher's work area where the instructor's office is located, a display wall for the students' works, and a display area of outstanding projects. An access control system was also installed so that authorized students can freely access the facilities using their access card, which facilitates extracurricular activities. These classrooms have laid a solid foundation for the effective implementation of this type of curriculum.

5.2.7 Example

The "Micro-movie" course developed by Teacher Huang Hong has the typical characteristics of an "imagination and creativity course." In this course, students need to observe life, find a central issue, then let loose their imaginations and write a movie script. The course spans disciplines such as general technical information technology and art, and the students need to use a video camera, recording equipment, and editing and processing software to turn their work into a finished product. The curriculum syllabus is as follows (Table 5.3).

5.3 Summary

By observing the development of the imagination • creativity school-based curriculum, we can unpack several experiences in the curriculum development practice of Xishan Senior High School, which will be discussed in more detail below. First, the current development department embodies the school's educational philosophy, and the curriculum development is geared toward cultivating the desired graduates. Second, the school has implemented some national courses in a school-based manner to solve several problems in the current school-based curriculum development. Third, the school has actively innovated new channels, gathered surrounding resources, and enhanced the professionalization of its school-based curriculum. This provides a technical path for others to learn from the same type of school-developed curriculum.

5.3.1 Consistency

The school's educational philosophy, curriculum objectives of the imagination • creativity courses, and actual curriculum development are consistent. The objectives of the imagination • creativity courses are in line with the school's educational philosophy and were developed under the guidance of the said educational philosophy. In the "Ten Major Training Standards" issued by Xishan Senior High School in 1926, there is a requirement to "develop a sensitive and sophisticated mind, practice the skills of increasing production." "A sensitive and sophisticated mind" can be "developed" through solving engineering problems. "Practice the skills of increasing production" requires students to be good at practice, diligent in practice, and "practice" within rigorous engineering norms. After comprehensive consideration of the "Ten Major Training Standards," the curriculum objectives of this category put forward requirements such as "strict thinking, good practice, insight into creation, and technical norms." Through the course study, students can achieve the objectives of "love life, are passionate, are creative, appreciate beauty, and love."

Table 5.3 "Campus Micro-movie" curriculum syllabus (partial)

Course title	**Campus Micro-movie**		Xishan Senior High School, Jiangsu Province		Huang Hong
Applicable grade	First- and Second-year high school	**Total class lesson periods**	**18**	**Course category**	Imagination and creativity
Course introduction	This course is suitable for first- and second-year senior high school students. It aims to lead students to pay attention to inner feelings, focus on campus life, and satisfy the desire of high school students for artistic expression and creation. The course covers the fields of literature, art, music, information technology, and so on. This course has the characteristics of cross-border learning, cooperative learning, and experiential learning. The course adopts a "constructive" cooperative learning model, allowing students to record the events around them, express the intricacies of campus life, and form correct social values. Students can choose different roles (screenplay, performance, video, post-production, etc.) for inquisitive learning. Course instructors are co-chaired by art and general technical teachers. The course will be assessed during the school's "Micro-movie Festival."				
Background analysis	Omitted				
Course objectives	Through this course, students will be able to: 1. Use micro-movie art language (such as landscape, sports, lens, etc.) to follow the basic processes of micro-movie creation to carry out micro-movie creation activities. 2. Experience four different roles (screenwriter, cameraman, performer, post-production worker), learn a skill in-depth, and apply that skill to micro-movie production. 3. In the group, actively undertake their role's tasks, and use their knowledge and skills to cooperatively produce at least two campus micro-movies. 4. Through the creation of the campus micro-movies, pay attention to the expression of inner feelings, take note of campus life, and convey positive beliefs. 5. Experience the educational significance of cooperation, sharing, respect, and reciprocity in the process of creating and communicating through campus micro-movies.				
Learning theme/activities arrangement	The main activities and processes are: sharing the course experience role—role inquiry—micro-movie shooting—micro-movie imitation show—show the micro-movie—movie festival.				
Assessment activities/ performance assessment	Omitted				
Main reference	Omitted				
Remarks	Omitted				

In recent years, Xishan Senior High School has proposed a mission to cultivate people who have "strong life, noble spirit, excellence in wisdom, and emotional fullness." In the curriculum plans for imagination • creativity courses, the objectives of cultivating engineers with superior intellect and designers with emotional fullness are consistent with the school's educational philosophy.

The courses within the imagination • creativity category are also in line with the school's educational philosophy. For example, in the "Bridge Design" course, students must complete an actual task and design a bridge over the canal to the east of the school that can allow cars and pedestrians to pass over. Students need to measure, design, and create a model, and then test it. In the process, they must plan and design like an engineer, develop a sensitive and precise mind at work, and practice, produce, and practice production skills through inquiry like an architect does.

It can be seen from the objectives of this category of courses that the individual development of each subject revolves around the school's educational philosophy, thereby achieving consistency between the two.

5.3.2 Innovation

Imagination • creativity courses have innovated the path of school-based implementation of the national curriculum. When Xishan Senior High School began developing the school-based curriculum of the imagination • creativity category, they implemented the national curriculum in a school-based manner and integrated the school-based curriculum, art curriculum, general technology, and information technology courses using the credit system. The new structure of the content of these courses covered the main subjects in the art and general technology curriculum. Such an implementation has the following advantages.

The first is that it solves the problem of which lesson period is to be used. In high school, teachers and students alike face the pressure of college entrance examinations. Students are relatively nervous during lesson periods, and the number of school-based courses is limited. Xishan Senior High School includes at least one art course, at least one general technology course, at least one school-based course, and at least one research-learning course per week. In this way, a system of elective courses with at least four per week has been formed at Xishan Senior High School. School-based courses, including those under the imagination • creativity category, thus have sufficient curriculum implementation time. Some of the courses such as "Micro-movie II" and "Engineering Science Innovation" can also be implemented using two lesson periods per week in back-to-back sessions.

The second advantage is that it solves the problem of who will conduct the teaching. In high schools, teachers generally have a heavy teaching load, and it is difficult to free up enough time and energy to teach school-based courses. The above-mentioned national curriculum will be implemented in a school-based manner, and all the courses in the first and second year of high school will be integrated

into the imagination • creativity curriculum system. This way, two out of the eight teachers of the Xishan Senior High School Art Department and the six teachers from the General Technology Department will become full-time school-based course (such as imagination • creativity courses) instructors. Given the team of teachers, there are also teaching and research activities for conducting school-based courses. Teachers can cooperate with each other to discuss how to improve the quality of the courses. At the end of each semester, the Art and General Technology subject groups organize a group of teachers to conduct end-of-semester teaching exchanges, share experiences, and negotiate future course development. This helps with the professionalism of the courses.

Another advantage is that it solves the problem of where the course content comes from. When teachers develop curriculum, some start from their personal interests and specialties, essentially teaching what they know. The result is a teacher-based curriculum development. The development of the imagination • creativity curriculum is based on the selection of academic elements from the fields of art, general technology, information technology, and physics. Thus, the content of the course has a foundation in specific fields; the academic nature of the curriculum content is guaranteed.

5.3.3 Professional Support

The professionalism of imagination • creativity courses is enhanced through resource gathering. The surrounding resources available to regular high schools are relatively limited, especially in suburban junctions like the one where Xishan Senior High School is located. Compared to big cities, the number of surrounding universities is fewer. Gathering resources during the curriculum development process to enhance professionalism is an urgent problem that needs to be solved.

The first method to meet this need that was adopted by Xishan Senior High School is to partner with universities. As early as 1996, in cooperation with the East China Normal University, the school systematically introduced the school-based curriculum theory and answered questions at the theoretical level to engage in curriculum development. During the initial planning for the imagination • creativity courses, the school approached Jiangnan University, which is 25 km away from the school and whose design major ranks among the top three in China, to work together in developing courses with a focus on "Industrial Design Foundation." The two sides reached an agreement to build a training base for national-level industrial design talents in Xishan Senior High School. Five professors from the School of Design of Jiangnan University came to Xishan Senior High School to teach each week. After revising the "Industrial Design Foundation," the courses became oriented toward the school-based curriculum. Xishan Senior High School sent a full-time teacher to study with five professors the whole time. The school cooperated with the university from the practice level of curriculum development, which greatly improved the degree of professionalism of the courses. In 2016, Xishan Senior High School

began to work with Nanjing Aerospace University, which is 172 km away from the school. The teachers and graduate students from the university came to the school every week to develop the "Unmanned Aerial Vehicle (UAV)" course.

Xishan Senior High School also actively sent teachers out for further study. To develop the "Micro-movie" course, the school used the summer vacation time to send instructors and key students to attend the summer classes of the Beijing Film Academy for further study. To develop the "Maker" course, the school selected three teachers involved in the course development to Kingswood College in Australia to study for a month and drew on their experiences for curriculum development. Xishan Senior High School cooperated with its sister school, Hainan junior high school, to jointly train instructors for courses on robotics. Thus, Xishan Senior High School enhanced the professionalism of its curriculum development through training its teachers.

References

Cui, Y. (2002). From "elective courses and activity classes" to "school-based courses". *Educational Development Research, 02*, 23–24.

Hu, X. (2017). Maker course: Let students form "abilities they can take away". *People's Education, Z1*, 76–77.

Kuang, Z. *Kuang Collections* [C]. Not published, Xishan Senior High School Library in Jiangsu Province.

Li, K., Huang, Y., Cai, Q., & Xu, Y. (2001). *Research on the development of high school curriculum in major countries of the world • Final report* (p. 78). Tainan: National Cheng Kung University Institute of Education.