

# Formulation of Work-Study Combined and Result-Oriented Integrated Curriculum Standards

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**Abstract** According to the Annex *Technical Regulations for Integrated Curriculum Development (Trial)* in Document No. 30 of the General Office of the Ministry of Human Resources and Social Security (2012), this paper studies the formulation of the curriculum standards for the integration of Chinese medicinal materials production. We focus on the formulation ideas of the curriculum standards for the integration of Chinese medicinal materials production, the formulation process of the curriculum standards for the integration of Chinese medicinal materials production, including the description of typical work tasks, the determination of curriculum objectives, the analysis of study content, the description of referential study tasks, teaching implementation suggestions, assessment and evaluation suggestions, which can provide a reference for the development and research of other related integrated courses.

**Key words** Integration of work and study, Work process, Curriculum standards, Production of Chinese medicinal materials, Typical work tasks, Referential study tasks

## 1 Introduction

The skilled talent training mode integrating work and study is a vocational education talent training mode actively promoted by the Ministry of Human Resources and Social Security. For teachers of vocational colleges, if they want to train students into high-quality technical talents who meet the needs of society and enterprises according to the concept of integrated curriculum teaching, it is very important and key to carry out integrated curriculum design. Curriculum standards are the most important, because curriculum standards are teaching guidance documents and can actually reflect the expectations of schools and teachers for students' study results. The Annex *Technical Regulations for Integrated Curriculum Development (Trial)* in Document No. 30 of the General Office of the Ministry of Human Resources and Social Security (2012) pointed out that: according to the needs of economic and social development and the law of skilled talent training, based on the national professional standards and national skilled talent training standards, taking professional ability as the training goal, the integrated curriculum refers to the curriculum characterized by the analysis of typical work tasks, construction of curriculum system, use of specific work tasks as the learning carrier, design and arrangement of teaching activities according to the work process and learners' autonomous learning requirements. According to the research of vocational education experts represented by Professor Felix Rauner at the University of Bremen in Germany<sup>[1]</sup>, the so-called "work process" is a complete work process carried out in an enterprise to complete a work task and obtain work results. It is a comprehensive system that is always in a state of operation but has a relatively fixed structure. Therefore, integrated curriculum often has the

characteristics of "combination of work and study, result orientation". The following takes the production of Chinese herbal medicines as an example to discuss the formulation of work-study combined and result-oriented integrated curriculum standards.

## 2 Formulation ideas

The formulation process of the integrated curriculum standards for the production of Chinese herbal medicines is as follows: hold an interview meeting with enterprise practice experts, and extract representative work tasks according to the work process of the production of Chinese herbal medicines (such as plant Chinese herbal medicines) by Chinese herbal medicines manufacturers (the extracted representative work tasks: planting of Chinese herbal medicines → harvesting of Chinese herbal medicines → processing of Chinese herbal medicines at the place of origin), form a typical work task list → complete the writing of typical work task description table under the guidance of enterprise practice experts → transform integrated curriculum → form an integrated curriculum framework table → formulate integrated curriculum standards.

## 3 Formulation process

Through the analysis of typical work tasks, the integrated Chinese herbal medicine production curriculum is determined. The curriculum standards generally include typical work task description, curriculum objectives, study content, referential study task description, teaching implementation suggestions, assessment and evaluation suggestions, etc.

**3.1 Description of typical work tasks** The content of typical work task description includes four elements of the production of Chinese herbal medicines: work content, work subject, work process, and work requirements. Work category: What is done, that is, what products are produced or what services are provided. Work subject: Who will do it, that is, which types of enterprises and personnel to complete this type of work. Work process: How

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to do it according to the planning, implementation, inspection and evaluation of work results and other links. Work requirements: How to do well, that is, the standards, specifications, or contractual requirements that should be followed to complete this type of work. At the same time, the description content of typical work tasks also needs to clearly describe the following content, that is, the completion of work tasks is in a certain working environment, in accordance with work requirements, in accordance with a certain work process, for different work objects corresponding to the

work process, using certain tools and materials, applying corresponding working methods, and through the cooperation of different staff, to finally complete a product or a service. That is to say, to complete a work, you need to be familiar with the working environment, working process, working objects, tools and materials, working methods, labor organization methods and work requirements<sup>[2]</sup>. The description table of typical tasks in the production of Chinese herbal medicines is shown in Table 1.

**Table 1 Description of typical work tasks in the production of Chinese herbal medicines**

| Name of typical work tasks  |   | Production of Chinese medicinal materials   |
|---|---|---|
| Description of typical work tasks   |   |   |
| [ Work Category ]   |   |   |
| The main tasks of the production of traditional Chinese medicine ( such as plant Chinese medicine ) are to identify the authenticity of seeds and seedlings of traditional Chinese medicine; to select seeds and seedlings; to plough and level the land; to sow and transplant; to carry out field management such as weeding, fertilization and irrigation; to control diseases and pests; to collect medicinal materials in time and carry out processing and storage in the producing area.   |   |   |
| The production of Chinese medicinal materials ( plant Chinese medicinal materials ) is the planting, harvesting and processing of Chinese medicinal materials.  |   |   |
| [ Work Subject ]  |   |   |
| The production of Chinese herbal medicines generally occurs in Chinese herbal medicine planting enterprises and crop farmers, and is mainly completed by Chinese herbal medicine growers at the intermediate worker level.  |   |   |
| [ Work Process ]  |   |   |
| Chinese herbal medicine growers receive tasks from the supervisor of the Chinese herbal medicine production department, and clarify the work content and requirements; according to professional books, task books, specifications and other relevant materials, to obtain, analyze, and determine the professional information necessary for the production of Chinese herbal medicines, estimate the risk of production, formulate a production plan for Chinese herbal medicines, and submit it to the department supervisor for approval; to check the production site, check whether the operating conditions for the planting of Chinese herbal medicines, the harvesting of Chinese herbal medicines, and the processing of Chinese herbal medicines are met, and to prepare appropriate, necessary and sufficient facilities and equipment; to complete the operation of planting, harvesting and processing of Chinese medicinal materials independently or cooperatively; the director of the production department of Chinese medicinal materials and quality management personnel conduct quality evaluation on the produced Chinese medicinal materials; Chinese herbal medicine growers sort out and archive production records and register ledgers. |   |   |
| [ Work Requirements ( Specifications ) ]  |   |   |
| During the production process, we must strictly abide by the <i>Good Manufacturing Practice for Chinese Medicinal Materials ( 2022 )</i> , <i>Pharmacopoeia of the People's Republic of China ( 2020 Edition )</i> , <i>Labor Law of the People's Republic of China</i> , <i>Labor Contract Law of the People's Republic of China</i> , etc.  |   |   |
| Work content analysis   |   |   |
| <b>Working object:</b><br>( i ) Reading and analysis of work tasks and production workflow.<br>( ii ) Communication with on-site personnel and heads of relevant departments for the production of Chinese herbal medicine.<br>( iii ) Survey of the production site to obtain detailed information on tasks such as planting, harvesting, and processing at the place of origin.<br>( iv ) Collection of production tools and equipment.<br>( v ) Field operations to produce Chinese herbal medicines.<br>( vi ) Production records, feedback, and archiving of ledgers.  | <b>Tools, materials, equipment and materials:</b><br><br>Tools: Sprayers, hoes, shovels and other agricultural machinery; labor protective equipment ( overalls, gloves ), etc.<br><br>Materials: Production records and other record forms, soil temperature and humidity daily monitoring record forms, Chinese herbal medicine quality inspection record forms, etc.<br><br>Equipment: Computer, soil temperature and humidity recorder, tillage equipment, etc.<br><br>Data: Professional books, <i>Good Manufacturing Practice for Chinese Medicinal Materials ( 2022 )</i> , <i>Pharmacopoeia of the People's Republic of China ( 2020 Edition )</i> , <i>Labor Law of the People's Republic of China</i> , <i>Labor Contract Law of the People's Republic of China</i> , etc.<br><br><b>Working method:</b><br>( i ) Communication method, information management method ( demand information recording, etc. ).<br>( ii ) Reading methods of professional books, information retrieval and field investigation methods.<br>( iii ) Feasibility analysis methods for planting Chinese medicinal materials, harvesting feasibility analysis methods, and processing feasibility analysis methods in production areas.<br>( iv ) Land preparation methods, propagation methods of Chinese medicinal materials, use methods of fertilizers, main disease and pest control methods for Chinese | <b>Work Requirements:</b><br>( i ) According to the task list, to clarify the work content, time, work standards and requirements, etc. , effectively communicate with customers, department heads, team members, etc. , and accurately obtain task information.<br>( ii ) According to the requirements of GAP and the basic norms related to the production of Chinese herbal medicines in enterprises, to formulate accurate, reasonable and qualified production plans for Chinese herbal medicines.<br>( iii ) Be able to report the production plan of Chinese herbal medicines to the department supervisor in the form of manuscripts, PPT, etc. , and improve and determine the final production plan of Chinese herbal medicines according to the feedback.<br>( iv ) To accurately evaluate the safety of conditions, environment, tools and equi- |

( To be continued )

(Continued)

| Name of typical work tasks | Production of Chinese medicinal materials  |
|----------------------------|--|
|                            | medicinal materials, safe use methods of commonly used fungicides and insecticides, storage methods of commonly used pesticides, harvesting methods of Chinese medicinal materials, and primary processing methods of Chinese medicinal materials, <i>etc.</i>   |
|                            | (v) Soil temperature and humidity detection methods, quality inspection methods of Chinese medicinal materials (identification of bases, appearance inspection and impurity inspection, detection of active ingredients, detection of toxic ingredients, heavy metals, pesticide residues and microbial indicators, <i>etc.</i>  |
|                            | (vi) Document filing method, information management method (form entry, statistics collection, inspection records, <i>etc.</i> ).  |
|                            | <b>Labor organization methods:</b>   |
|                            | (i) The supervisor of the Chinese herbal medicine production department receives the task, communicates with relevant departments or customers, and clarifies the work task requirements.  |
|                            | (ii) The head of the production department distributes tasks to the Chinese herbal medicine grower.  |
|                            | (iii) The Chinese herbal medicine grower accepts the task, formulates the production plan of Chinese herbal medicine, and submits it to the department supervisor for approval.  |
|                            | (iv) According to the approved production plan of Chinese herbal medicines, to independently complete the daily management and inspection of Chinese herbal medicines, soil temperature and humidity monitoring, disease and pest management and other work during the planting process, and cooperate to complete land preparation and sowing, field management, harvesting and processing of origin and handling of abnormal problems during production of Chinese herbal medicines. |
|                            | plement in the production process in accordance with the enterprise's safety production management regulations for Chinese medicinal materials, and take effective protective and preventive measures to ensure the safety of personnel and Chinese medicinal materials in the production process. <i>etc.</i>   |
|                            | (v) According to the production plan of Chinese medicinal materials, to complete the production of Chinese medicinal materials in accordance with the requirements of GAP.   |
|                            | (vi) To give timely and accurate feedback on the risk estimation before the production of Chinese herbal medicines, and deal with abnormal situations in the production process in a timely manner according to the prescribed procedures; complete relevant record archiving and ledger registration in accordance with the archived document sorting specification.  |

Occupational Competence Requirements

- (i) Be able to effectively communicate with the head of the Chinese herbal medicine production department, clarify the needs of relevant departments or customers and work task requirements, and have good professional communication skills and service awareness.
- (ii) To understand the area, growth period, harvesting time of the Chinese medicinal materials to be planted, processing requirements of the place of origin, *etc.* , and be able to comprehensively think about formulating the production plan of Chinese medicinal materials and report and improve it according to the needs of relevant departments or customers and the characteristics of planting Chinese medicinal materials, combined with the planting site, harvesting and site processing conditions and equipment types, and have good communication and coordination skills and language expression skills.
- (iii) Be able to complete the production of Chinese medicinal materials in accordance with the requirements of GAP and the basic specifications related to the production of Chinese medicinal materials in the enterprise, and handle the abnormal operation process, with strong execution, labor spirit and efficiency awareness.
- (iv) Be able to strictly and meticulously investigate potential safety hazards in accordance with the enterprise's Chinese herbal medicine safety production management regulations, use production experience to analyze abnormalities, estimate risks, propose solutions, and have the ability to analyze and solve problems.
- (v) Be able to complete relevant record archiving and data processing work in accordance with the requirements of archived document sorting specifications, and have strong information retrieval capabilities, information collection and analysis capabilities.
- (vi) Be able to comprehensively and accurately classify and process data, analyze the quality of produced Chinese medicinal materials, form a production quality analysis report of Chinese medicinal materials, and have a strong sense of cost, quality and responsibility.

**3.2 Determination of curriculum objectives** The goal of the integrated curriculum is that students should have the professional ability corresponding to typical work tasks after completing a certain integrated curriculum (such as the production of Chinese medicinal materials). Therefore, the curriculum objectives should be determined according to the requirements of professional ability.

Integrated curriculum objectives are generally described as comprehensive objectives and specific objectives. The comprehensive objectives can be used as the evaluation scale to measure the improvement of professional ability after completing the course, and also reflects the study value of the course. Specific objectives are the basis for evaluating the effectiveness of the curriculum, and also the basis for determining the study content. The content of comprehensive objectives mainly comes from the first element "work category" in the description of typical work tasks, which

can be described according to "what kind of work students should be competent for after studying this course"<sup>[3]</sup>. The content of specific objectives mainly comes from the fourth element "work requirements" and work content analysis in the description of typical work tasks, specifically describing "what resources can be obtained, what methods and technical means can be applied, and what work standards or work specifications can be followed, what work results can be formed", and at the same time paying attention to describing the training goals of invisible ability.

**3.3 Analysis of study content** The study content includes two parts: course content and referential study tasks. Curriculum content is the concretization of curriculum objectives. Curriculum content is the basis for determining specific study tasks from referential study tasks, and it is also the basis for comprehensive evaluation of integrated courses. The content of the course is mainly de-

scribed according to the specific objectives of the course to sort out knowledge, skills, professionalism and working methods one by one. Referential study task is the main content of curriculum teaching, and the specific description will be elaborated in the fol-

low-up "Selection of Referential Study Task". See Table 2 for examples of the study content of Chinese herbal medicine production, and the study content is introduced with the referential work task of Chinese herbal medicine planting as an example.

Table 2 Study content of Chinese herbal medicine planting

|  |   |
|--|---|
| The main contents of this course include:  |   |
| 1. Cultivation of Chinese herbal medicines |   |
| (i) Knowledge:                             | <div>① Physiological basis of medicinal plants; Physiological principles of growth and development of medicinal plants; the relationship between the growth and development of medicinal plants and environmental conditions.</div> <div>② Land preparation and sowing; Seed morphology and identification of Chinese medicinal materials.</div> <div>③ Field management; Morphological characteristics of seedlings of commonly used Chinese medicinal materials; the types and properties of fertilizers; nutrition and fertilization of Chinese medicinal materials; field management of Chinese medicinal materials.</div> <div>④ Prevention and control of diseases and pests; The main types of diseases and pests for Chinese medicinal materials; types and functions of commonly used fungicides and insecticides.</div> <div>⑤ Relevant laws and regulations; <i>Good Manufacturing Practice for Chinese Medicinal Materials (2022)</i>, <i>Pharmacopoeia of the People's Republic of China (2020 Edition)</i>, <i>Labor Law of the People's Republic of China</i>, <i>Labor Contract Law of the People's Republic of China</i>, etc.</div> |
| (ii) Skills;                               | Identification of the true and false seeds of Chinese medicinal materials; development of planting plans; standardized use of land preparation tools and equipment; sowing and raising seedlings of Chinese medicinal materials; development and operation of fertilization and irrigation schemes; pest control.   |
| (iii) Working methods;                     | Soil tillage and land preparation methods; reproduction methods of commonly used Chinese medicinal materials; field management methods; how fertilizer is used; main diseases and pest control methods of Chinese medicinal materials; safe use of common fungicides and insecticides; integrated methods of disease and pest management; preservation methods of common pesticides.  |

**3.4 Description of referential study tasks** Referential study task is transformed from the representative work task determined in the interview meeting of practical experts. Generally, referential study task should reflect the complete work process, that is, it embodies the six steps of defining task → making plan → validating plan (making decision) → implementing plan → process control

→ acceptance summary (evaluation feedback). In terms of description, referential study tasks are generally composed of referential study task names, study task descriptions, referential study hours, etc. Examples of referential study tasks for the production of Chinese herbal medicines are shown in Table 3.

Table 3 Description of referential study tasks (planting Chinese herbal medicines)

| Name                             | Study task description   | Referential study hours |
|----------------------------------|--|-------------------------|
| Chinese herbal medicine planting | <div>A Chinese herbal medicine planter received a safflower planting task issued by the planting department. He needs to complete the land preparation and sowing of 667 m<sup>2</sup> safflower within 5 days. Later, field management and pest control for safflower will be carried out at an appropriate time until safflower can be harvested.</div> <div>Students receive work task orders from teachers, consult relevant materials, obtain, analyze, and determine professional information necessary for safflower production based on professional books, task books, specifications and other relevant materials, and clarify task content, time, progress plan and quality requirements; carry out the risk estimation of production under the guidance of teachers, and formulate the plan for safflower planting; check the production site, check whether the operating conditions for site preparation and sowing, field management and pest control are met, and prepare appropriate, necessary and sufficient facilities and equipment; carry out land preparation and sowing, field management, and pest control for safflower planting through cooperation or independent completion in accordance with operating procedures and specifications, and cooperate with students to complete the handling of abnormal situations under the guidance of teachers; complete the quality assessment of safflower planting independently, and submit it to the teacher for acceptance; complete planting site arrangement, maintenance of equipment and tools, preparation of work log, etc.</div> <div>During the work process, students should strictly implement the <i>Quality Management Standards for the Production of Chinese Medicinal Materials (2022)</i>, <i>Pharmacopoeia of the People's Republic of China (2020 Edition)</i>, <i>Labor Law of the People's Republic of China</i>, <i>Labor Contract Law of the People's Republic of China</i> and other relevant documents.</div> | 120                     |

3.5 Recommendations on teaching implementation

**3.5.1** Teacher resource requirements. Teachers must have enterprised practical experience in the production and operation of Chinese medicinal materials and have the ability of teaching design and implementation of the integrated course of Chinese herbal med-

icine production, the selection and application of integrated course teaching resources, etc.

**3.5.2** Recommendations on teaching organization. An action-oriented teaching approach is used. In order to ensure teaching safety, rationally use training facilities and equipment, and improve

teaching effects, it is recommended to adopt the form of group teaching (4–6 people/group), which is convenient for job rotation, and at the same time cultivate students' ability of communication and teamwork; in the process of completing work tasks, teachers must strengthen demonstration and guidance, pay attention to the cultivation of students' professional quality and standardized operation.

**3.5.3 Recommendations on teaching resource allocation.** Chinese herbal medicine production and study workstations must have good safety performance, lighting and ventilation conditions, and should include planting areas, harvesting areas, production and processing areas, centralized teaching areas, information retrieval areas, group practice areas, and achievement reporting areas, and be equipped with corresponding multimedia teaching equipment and other facilities, the area should accommodate at least 35 people at the same time to carry out teaching activities.

Configuration by group: Sprayers, hoes, shovels and other agricultural machinery; labor protective equipment (overalls, gloves, *etc.*) and other tools; production records and other record forms, soil temperature and humidity daily monitoring record forms, Chinese herbal medicine quality inspection record forms and other materials; computers, soil temperature and humidity recorders, farming equipment and other equipment.

It is mainly dominated by work pages, equipped with teaching materials, instruction manuals and other teaching materials.

**3.5.4 Teaching management system.** The management regulations of integrated teaching places are implemented.

**3.6 Assessment and evaluation suggestions** The assessment of the curriculum adopts a combination of process assessment and final assessment. The process assessment focuses on assessing students' labor discipline, professional ethics and literacy, and their mastery of knowledge and skills. It is necessary to design a process assessment evaluation form. The final assessment focuses on examining students' comprehensive professional ability, implementing the ability to produce related products according to the formulated production plan, and can review, summarize and analyze the problems and deficiencies in the work process through the quality of finished products, and propose future improvement measures. According to self-evaluation, group evaluation and teacher evaluation, the performance of group members in the completion of study tasks is comprehensively evaluated. The evaluation table is designed according to the actual situation.

## 4 Conclusion

Taking the production of Chinese herbal medicines as an example, this paper discusses the formulation ideas and the formulation process of integrated curriculum standards, which involves the extraction of typical work tasks, the transformation of study tasks, the selection and reconstruction of curriculum content, and many other contents. From this, we deeply understand that the formula-

tion process of integrated curriculum standards of "combination of work and study, achievement orientation" requires not only the guidance of curriculum experts and the participation of enterprise practice experts, but also the active thinking of professional teachers. In the process of setting curriculum standards, although different types and levels of teachers participate in different degrees and play different roles, professional teachers can further deepen their understanding of work-study integrated courses, reshape teachers' teaching concepts, and improve teachers' ability to create teaching situations and improve classroom teaching effects through in-depth participation and teaching experience in the process of setting curriculum standards.

The work-study combined, result-oriented integrated education model is to allow students to learn to work in the process of study courses through the cultivation of students. Study and work are integrated. It uses typical work tasks as the carrier to design professional teaching units. There is no corresponding relationship with the subject knowledge field. Through the study of a course, students can complete a typical work task of a certain occupation; through the study of multiple courses, students can obtain the qualification to engage in a certain profession<sup>[4]</sup>. The work-study combined education model is a vocational education model vigorously promoted by the Ministry of Human Resources and Social Security, which has a positive role in promoting the development of vocational education. This paper studies the establishment of the integrated curriculum standard of "combination of work and study and result orientation" as the subject, which is a concrete manifestation of thoroughly implementing *Opinions on Deepening the Reform of Modern Vocational Education System Construction* jointly issued by the General Office of the Central Committee of the Communist Party of China and the General Office of the State Council. It focuses on the reform of core courses, practical project construction, new methods, new technologies, teaching and evaluation methods, *etc.* It not only enables the trained students to meet the needs of career development and employment, but also explores new ways and methods for teaching reform, which can provide certain reference significance for the teaching reform of related majors.

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