Course Design of “Urban Fruit Production” Based on Working Process Systematization

Zhaoquan Gao*, Jianjun Cheng, Hengjiu Lei and Xiaoyun Wu
Beijing Vocational College of Agriculture, Beijing 102442, China

*Corresponding author e-mail: gaozhaoquan@sina.com

Abstract. The course design of “Urban Fruit Production” was guided by the systematization theory of working process. The course content was based on the job requirements of fruit production management positions in modern urban agriculture, integrating various exemplary works such as fruit tree seedling, sightseeing orchard design, management of urban orchards, and informatization management into a series of work tasks. Then the corresponding learning scenarios were designed according to the six-step method. The instructors organized action-oriented teaching activities and allowed students to learn in a “real” working environment. The students learned to master key skills in urban fruit production management and improved their overall competencies by completing the working tasks.

Keywords: Working Process, Curriculum Design, Horticultural Technology, Fruit Production, Urban Agriculture

1. Introduction
The “Urban Fruit Production” is a core course of horticulture technology [1,2]. For the course construction, the horticulture technology program of Beijing Vocational College of Agriculture developed this course based on fruit tree production, targeting at higher vocational education and serving urban modern agricultural production. It is centered on job requirements and highlights skill trainings for fruit tree seedling, construction of leisure and sightseeing orchards, orchard management technology, and application of orchard informatization, fully exhibiting the professionalism, practicality and openness of the course. The course is based on horticulture and plant identification, plant growth and the environment. The related supporting courses include urban vegetable production, ornamental horticulture, and pest control. The course was designed under the guidance of the systemization of working process. In response to the teaching reform for higher vocational education, the job duties and responsibilities of urban fruit production management were refined into exemplary teaching tasks, so that students could learn in a “real” work environment, master fruit production management skills and improve their overall competencies by completing the job tasks. The vocational education reform guided by the theory of working process systematization was in line with the characteristics of vocational education and the learning pattern of actionable knowledge, and is the development direction of modern vocational education[3,4]. The vocational education of working process systematization needs to be fulfilled by work tasks. It not only focuses on the training of
professional skills, but also highlighting the cultivation of non-professional abilities. The key to teaching quality is rooted in the quality of course design [4,5,6]. This article took the course design of “Urban Fruit Production” in the horticulture technology program as an example to briefly introduce the application of working process systemization theory in course design.

2. Results

2.1. General Idea of “Urban Fruit Production” Course Design

The course design of “Urban Fruit Production” was carried out under the background of a new round of teaching reform of horticultural technology specialized courses in our college. Based on the talent training model of “driven by four seasons, double integration and double promotion” and oriented by the typical tasks of “urban fruit production” in urban horticulture production management, the horticultural technology program cooperated with the companies to determine the exemplary tasks in urban fruit production, outlined the working areas [7,8,9], designed the teaching scenarios, and completed the course development. The goal of this course is to achieve the first-class ability development for this major. Based on the market research and seminars, we summarized the tasks and requirements of urban fruit production management positions (Figure 1), sequentialized the task contents and requirements according to the working process, and set up the task units of teaching. Then according to the task requirements, we established a series of complete working scenarios, and instructed students to learn in the working process according to the teaching requirements of action-oriented method.

2.2. Position Analysis of the “Urban Fruit Production” Course

Based on a fully investigation of the fruit production-related companies in Beijing and according to the demands of Beijing’s modern urban agricultural fruit production management, the core instructors and company experts cooperated to analyze the work tasks, discussed the core competencies of professional positions, and determined the core skills. We optimized and screened out the specific management technology requirements for fruit production, such as “sightseeing orchard design”, “blossom and fruit thinning”, “pruning and shaping”, “fruit tree landscaping”, and “informatization management”, and then sequentialized them according to the working process and turned them into the learning tasks of the “Urban Fruit Production” course (Figure 1). Furthermore, these tasks were sequentialized according to the life cycle of the fruit trees [7], and the teaching was conducted using the fruit tree production as a carrier. By position analysis, job requirements were integrated into the teaching content of the “Urban Fruit Production” course to achieve the connection between teaching
content and job positions. The teaching process and content of “Urban Fruit Production” course was designed with real job tasks as the carrier, and reached the goal of innovative teaching mode and teaching method reform. At the same time, it took into account the job demands of the front-line production of the urban fruit tree industry and conducted the comprehensive development and design of the course based on the knowledge, skills and quality requirements of the job positions, fully showing the professional, practical and open design concepts of modern course [10].

Figure 2. Major projects and hourly percentages of the urban fruit production course

2.3. Structure Design of the “Urban Fruit Production” Course

The urban fruit production course consisted of 11 large projects (Figure 2), with a total of 70 learning tasks, of which 30 were learning tasks related to theoretical and technical knowledge, and 40 were operational or comprehensive skills training tasks. All the tasks were sequentialized according to the life cycle of the fruit trees. Each work task included several parallel or progressive learning scenarios. While each learning scenario was a small work task and was composed of a complete working process including six steps, information, decision, planning, implementation, inspection, and evaluation. Taking the task of assisting pollination of fruit trees as an example, in fruit production assisted-pollination is usually required, such as bee placement, point pollination, and flower pairing. According to such production needs, we designed assisted-pollination tasks, including three subtasks: pollination by bee placement in an apple orchard, artificial point pollination for pear trees, and pollination by implement such as a feather duster. According to these three sub-tasks, corresponding materials and tools were prepared and the students were instructed to complete the tasks at an appropriate time in field (Figure 3). Meanwhile, in order to help students further learn relevant technology and knowledge, during internships we also allowed students to take charge of a certain number of fruit trees and run the crop production management by themselves, further consolidating and deepening their knowledge and skills.
2.4. Teaching Content and Hours
The exemplary work tasks extracted from the job requirements of urban fruit production were the teaching content of this course. All work tasks were designed according to the job requirements and professional action processes. The required core technology, professional knowledge and comprehensive ability were integrated into the work tasks. The objects, tools and materials, methods, labor organization, task requirements, and expanded knowledge of urban fruit production management were all included in each task. The key content of this course was to enable students to master the techniques of fruit tree seedling, sightseeing orchard design, blossom and fruit thinning, pruning and shaping, fruit quality improvement, including both theoretical and practical teaching. The teaching content altogether need a total of 160 hours, of which 40 hours of practical training were allocated to the comprehensive training and internship, while the required 120 hours for in-class teaching were planned to be finished in two semesters.

2.5. Integrated Theory and Practice Teaching
According to action-oriented teaching[11], this course implemented teaching via integrated theory and practice and overall improved students’ comprehensive ability. The theoretical and knowledgeable content was mainly taught through indoor learning tasks, using approaches like extended groups, role-playing, and merry-go-rounds[12] to conduct literature search and independent learning. The operational skills training (57% of all hours) was carried out by in-field training at the training center, and some of the comprehensive training was performed during the internship. The entire teaching integrated learning and production, not only strengthening the students’ professional abilities, but also emphasizing the training of non-professional abilities, especially plan formulation, teamwork, informatized management and writing skills. By completing a whole working process, the students learned to independently solve problems arising from the work scenarios, independently conduct planning and implement the work plans, and were allowed to make mistakes. Students dominated in the work. Instead of being passively stimulated recipients, students gained knowledge by actively selecting and processing the external information. Before class, the students were asked to search literature for work task-related knowledge. During the teaching process, the instructor consciously incorporated theoretical knowledge into the working process to illustrate, and prepared teaching materials, related books, task lists, etc. at the work sites to help students find information. After each task was completed, the students were asked to write work reports to consolidate their knowledge and skills.

Figure 3. Task design for assisted pollination of fruit trees
Acknowledgments
This work is supported by the Program for Beijing Vocational College of Agriculture (grant No. XY-YF-18-01), the Program for Beijing Vocational College Teachers Quality Improvement Program (2017-2020) (Innovation Team of Horticultural Technology in Beijing Agricultural Vocational College).

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