

The teaching practice of project teaching method in secondary school landscape profession

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Abstract: The project teaching method is applied to the secondary school teaching, penetrating the teaching concept of teacher-led students' main body, taking the experiment of "determination of seed living force" as an example to carry out teaching practice. The aim is to improve students' professional learning ability and enhance their vocational adaptability, and at the same time, to provide some reference for the reform of secondary school teaching.

1. Introduction

The National Implementation Plan for Vocational Education Reform (2019) puts forward the task of the three teaching reforms (teachers, teaching materials and teaching methods), aiming to cultivate high-quality workers and technically skilled talents to meet the social needs of the accelerating industrial upgrading and economic restructuring^[1]. Teaching is the most basic form of education in school education, and any advanced school philosophy and teaching reform model must be implemented through teaching activities, and the key way to promote teaching reform is to promote the reform of teaching methods^[2,3].

Project-based-learning, also known as project-based learning, is a student-oriented activity teaching method jointly created by American educator Katz and Canadian educator Chad^[4], which requires teachers to choose projects close to students' real life and can mobilize students' enthusiasm to carry out teaching activities, and advocates that students learn through independent, cooperative and inquiry-based learning. It is a new teaching method that requires teachers to select projects that are close to students' life and can motivate them to carry out teaching activities.

"Determination of seed viability" is one of the sections in the competence development section of the textbook "Plant Production and Environment" for secondary-level gardening. As far as the content of the textbook is concerned, the course of "Plant Production and Environment" has obvious cross-cutting and practical nature^[5], covering the contents of botany, plant physiology, agricultural meteorology, soil science and fertilizer, etc. Its teaching content is complicated, abstract and obscure, so it is difficult to obtain the ideal teaching effect by using the traditional lecture-based teaching mode, and it is timely to adopt a new teaching mode with project as the main line, teacher-led and student-led. The new teaching mode of project-based, teacher-led and student-led can fully mobilize students' learning initiative and improve the quality of the practical course of Plant Production and Environment.

2. Teaching strategies for project-based teaching methods

Scholars at home and abroad have provided relevant descriptions on the process of project teaching method, but they all have certain differences. Wang Ren^[6] introduced project teaching method in landscape design teaching, and considered the process of project teaching method as theoretical learning, field exploration, project preparation, project implementation and project evaluation. Xue Lei^[7] proposed a project teaching method based on computational thinking and considered the basic process of project teaching method as project design, plan development, plan implementation, group self-assessment, presentation and communication and comprehensive

evaluation. Zhang Su^[8] believed that the process of project teaching method includes the design of teaching content, teaching organization and teaching effect. Chen Xuhui^[9] et al. considered the process of project teaching method as five steps: project introduction, knowledge paving, program development, evaluation summary and knowledge expansion. Sudjimat D A. et al^[10] considered the process of project teaching method as three aspects: project planning, project implementation and project evaluation. According to the process of project teaching method defined by domestic and foreign scholars, and also combined with the characteristics of the laboratory course "Plant Production and Environment", the teaching process of project teaching method is summarized as shown in Figure 1.

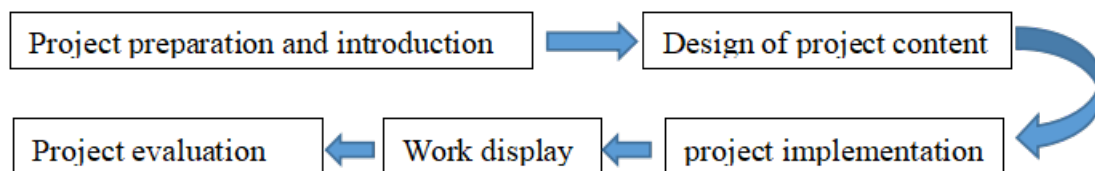


Figure 1 teaching process of project teaching method

Based on the teaching process of project teaching method, combined with the characteristics of the course "Plant Production and Environment", in the specific practice, it advocates the project as the main line, around the five parts of project preparation, project design, project implementation, results presentation and project evaluation, through a certain difficulty and gradient, gradually progressive teaching design to carry out the teaching content. The design of this teaching model is shown in Figure 2.

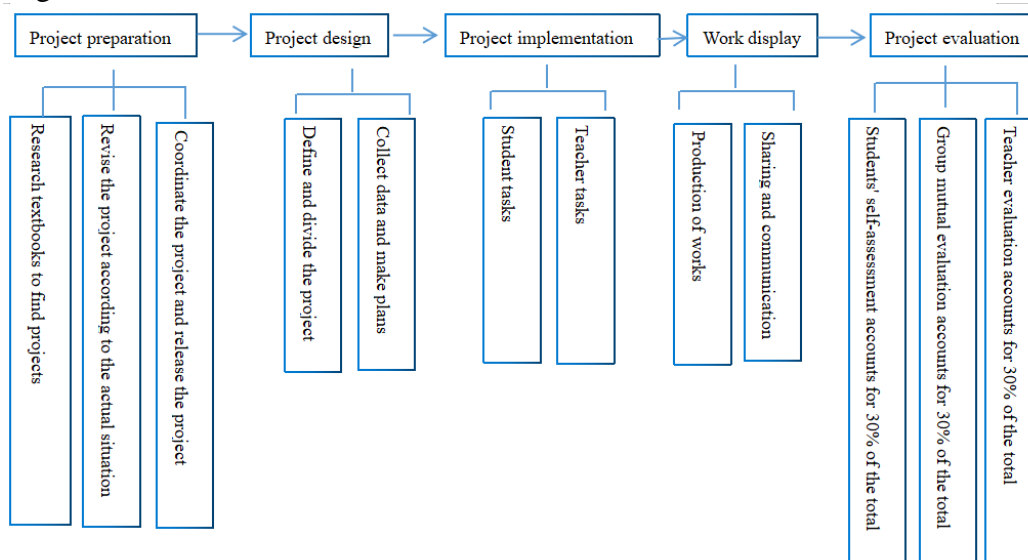


Figure2 Teaching mode of project teaching method

2.1. Project preparation

(1) Study the teaching materials and look for projects. Before implementing the project teaching method, teachers should analyze the teaching materials and look for specific teaching projects that can carry out project teaching.

(2) Revise the project in relation to the reality. Analyze the students' learning situation, understand the level of knowledge they have reached and the level of knowledge they have not yet reached, consider the school's hardware and software facilities, and make corrections to the selected existing projects, which should be based on the students' life experience, and choose teaching projects that are interesting to them, close to their life reality, and of equal difficulty.

(3) Coordinate projects and publish them. Teachers make careful selection of projects, and the selected projects should have a certain hierarchy, systematization and completeness in order to fully mobilize students' learning enthusiasm.

2.2. Project design

(1) Clarify the project and divide the tasks. Group students according to their knowledge base, interests, personality traits, gender differences, etc., and select group leaders. Under the guidance of the teacher, the group members need to divide the project and divide the tasks accordingly.

(2) Collect information and determine the program. According to their division of labor, group members take the initiative to collect information to support the project, summarize and organize the collected information, and develop a plan to implement the project through group decision-making.

2.3. Project implementation

(1) Student tasks. Students achieve knowledge construction while completing a series of project tasks according to the project plan. Students are required to have the ability to think independently and learn cooperatively in the process of project implementation to ensure the smooth running of the project.

(2) Teacher tasks. Teachers should pay attention to control the teaching progress and provide timely guidance to answer questions for groups that have difficulties in the project implementation process. When students complete a task, teachers should reasonably give certain rewards to maintain students' enthusiasm for continued inquiry. Project implementation is somewhat open-ended, so teachers should also control the classroom atmosphere and maintain classroom discipline to create an efficient classroom in which everyone participates.

2.4. Display of works

(1) "Work" production. Students participate in the entire project and process and refine the results of the project to produce a "work". The "work" must be authentic, accurate and logical, and must not be made up for the sake of the desired result. The project "work" may take different forms, such as experimental results, artifacts, a practical problem solved, investigation reports, etc.

(2) Share and exchange. After the group members finish the whole project, students need to analyze the whole project in detail and submit a summary of the project, and the group representatives present their group's work on stage, which can be in the form of PPT, experimental results or oral report, etc. By reporting the results of their group's work, students can exercise their ability to communicate and integrate their thinking.

2.5. Project evaluation

Teachers and students respectively make diversified evaluations of the students presenting, with students' self-evaluation accounting for 30%, group evaluation accounting for 30% and teachers' evaluation accounting for 40%. The evaluation link should reflect the original intention of fairness and impartiality, fully respect the development of students' personality, and cultivate students' comprehensive ability to adapt to the future workplace, and avoid the single evaluation method of score-only. At the same time, students need to self-reflection on the project results and evaluation results, to find out their weak points for correction, so as to motivate students to try again to practice.

3. Implementation of teaching cases of the project teaching method

3.1. Project preparation

"Students have the ability to dissect different seeds accurately and to distinguish the presence or absence of endosperm and the size and structure of embryos. In this lesson, students can further improve their general skills and develop their rational thinking. In order to enhance students' interest in learning, wheat seeds, which are close to the actual life of students, were chosen as experimental materials and per-experiments were conducted to arrive at 85% viability of wheat seeds, while experimental apparatus and reagents were prepared in advance as follows.

Apparatus and reagents: blade, forceps, Petri dish, magnifying glass, filter paper, wheat seeds

soaked overnight, TTC (2,3,5-triphenyltetrazolium chloride) staining solution, 5% red ink.

3.2. Project design

According to the principle of homogeneity between groups and heterogeneity within groups, students were divided into six groups of seven members each, group members elected the group leader, the group leader assigned tasks according to the personality characteristics and learning ability of the group members, group members divided the work according to their tasks to find information and summarized the information found to determine the project plan. The first three groups were selected to determine the viability of wheat seeds by the TTC staining method and the last three groups were selected to determine the viability of seeds by the red ink staining method after the statistics and corresponding adjustments were made.

3.3. Project implementation

Project implementation is a key part of the project teaching method. Before conducting the experiment, students should be told some precautions of the experiment to ensure the safety of the experiment, especially TTC is a toxic biological staining solution, and students are warned to be careful when using it. In the experimental process, the teacher should give the initiative of learning to the students, exercise the students' hands-on ability at the same time, let the students learn to think by themselves, so that the problem can be solved. The experimental methods and steps are shown in Table 1.

Table1 Determination Methods and steps of seed viability

Steps	Methods	Method of dyeing with TTC	Method of dyeing with red ink
Seed treatment		Take out 100 wheat seeds, drain the water, and cut them into two halves longitudinally along the center of the embryo with a blade	Be treated the same
Seed dyeing		Take half of all parts of the embryo, put it into the beaker, add 0.1% TTC solution to remove the seeds, and dye in a 35 °C incubator for 30 minutes	Add 5% red ink until the seeds are immersed, and the rest are treated the same
Washing seeds		Rinse the seeds twice with clean water	Be treated the same
Vitality observation		The seeds that are stained completely are living seeds with strong vitality, and the seeds that are not stained completely are dead seeds. The vitality of those with light color is weak(Judging seed viability)	Be treated the same
Calculate germination rate		Calculate the number of seeds without coloring (live seeds) of seed embryo and calculate the seed germination rate Germination rate = number of germinated seeds ÷ total number of germinated seeds × 100% (keep two decimal places for the result)	The number of seeds without coloring(live seeds)and germination rate were calculated. Do the same for the rest

3.4. Presentation of work

Group representatives came on stage to present their group's learning results by recalling the project process, sharing the successful sessions and analyzing the reasons for the failed sessions with a view to succeeding next time. From the experimental results, the germination rate of wheat seeds calculated by the five groups was concentrated at 85%, only the second group (TTC staining method to measure seed viability) had an experimental result of 60%. The group representatives analyzed the reason for this was that the more complete embryos were not selected for staining when the seeds were stained.

3.5. Project evaluation

The whole project session was objectively evaluated and scored in a comprehensive manner using diversified evaluation methods, and finally the teacher summarized the whole project session, affirming the students' efforts, followed by praising and affirming the outstanding aspects of the project process, and at the same time giving advice and suggestions on the deficient aspects in order that the students could do better.

4. Conclusion

The project teaching method was adopted. In the project preparation session, the section of "Determination of the living force of seeds", which is close to the students' life and can stimulate their interest in learning, was chosen. In the project design session, the students could consciously collect data and come up with feasible project plans according to the specific tasks assigned by the group leader. The implementation of the project reflects the teaching concept of teacher-led and student-led, integrating theoretical knowledge and practical operation, which can effectively promote the practical transformation of students' theoretical knowledge and thus enhance their professional ability. In the work presentation session, group representatives present their results on stage, which improves learning efficiency and teaching quality. The project evaluation session carries out diversified evaluation methods, which breaks the traditional evaluation method of taking the examination results as the only criterion, and the students' participation is high. From the viewpoint of teaching objectives, students have basically mastered the determination method of seed living force through cooperative learning and can analyze the reasons for the experimental results; from the viewpoint of teaching effect, students can actively participate in the whole process of project teaching activities, under the guidance of teachers, students have completed the teaching task at the same time, improve the professional level of students, cultivate students' practical ability, and lay the foundation for later entering the workplace, which is worth applying and trying.

References

- [1] Notice of the State Council on the Issuance of the National Implementation Plan for Vocational Education Reform. Bulletin of the Ministry of Education of the People's Republic of China. no.21, pp.9-16, 2019.
- [2]Liang Kedong,Wang Yanan. The innovative path of vocational education talent training and evaluation reform based on "three education reforms". China vocational and technical education, no.28, pp.28-34, 2019.
- [3]Wu Baoming. The reform of "three teachings" in higher vocational institutions under the vision of integration of industry and education. Education and Career, no.06, pp.51-54, 2021.
- [4] Wang Ping. The practice of project teaching method in professional courses. Education and Career, no.30, pp.129-130, 2009.
- [5]Lan Xinrong. Exploring the teaching reform of the course "Plant Production and Environment" in secondary schools. Curriculum Education Research, no.50, pp.46-47, 2019.
- [6]Wang Ren. Application of project teaching method in higher vocational landscape planning and design course. Education and Career, no.18, pp.151-152, 2014.
- [7]Xue Lei,Sun Yuqiang,Gu Xiaoqing. Research and practice of project teaching method based on computational thinking. Education and Career, no.32, pp.148-150, 2012.
- [8]Zhang Su,Li Aijun,Zhang Xiaoyan. Research on the application of project teaching method in higher vocational teaching. China Adult Education, no.13, pp.132-133, 2010.

- [9]Chen XH,Zhang RS. Project development, teaching design and its application of project teaching. Chinese vocational and technical education, no.08, pp.59-61, 2009.
- [10]Sudjimat, D. A. (2019, February). Study of implementation of project based learning in mechanical engineering study program of vocational high school. Journal of Physics, 2019, vol.1165, no.1, pp.20-24.