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A New Exploration of Practical Teaching Reform in the Department of Plant Protection of Hebei North University

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Abstract: In view of the existing problems in the practical teaching of Plant Protection majors, such as more teaching contents, less comprehensive and innovative contents, disorganized practical teaching system, lenient assessment, insufficient experimental teaching facilities, insufficient practical teaching sites, and lack of continuity of practical teaching contents. The practical teaching of plant protection majors should adopt "open" practice teaching methods in terms of laboratory construction, innovative ability cultivation, practical teaching content highlighting comprehensive and innovative, and practical teaching time. The results of the survey on college graduates and enterprises show that under the "open" practice mode, Plant Protection students will have better overall performance.

Keywords: Vocational and technical high school teachers; Plant protection majors; Practical teaching; Reform exploration

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1. Introduction

Plant Protection is a practical agricultural discipline which covers a wide range of fields such as technical design, research and development, management, teaching and research, and aims to cultivate applied and complex talents [1,2]. The agricultural is receiving massive attention with the rapid development of China's economy, and the demand for agricultural technical personnel is increasing as well as the quality of farmers. Therefore, farmers should not only have solid theoretical knowledge, but also have excellent practical skills. However, there are many problems in the traditional teaching of plant protection, both in theory and in practice, which have a great impact on the development of students' hands-on ability and creativity [3-5]. At present, the quality of education of our college graduates can no longer meet the needs of the new situations and development. Hence, it is urgent to explore and build a new type of theoretical and practical teaching system.

2. Significance of the reformation

Since the establishment of the Department of Plant Protection of Hebei North University, the leadership of the department has attached great importance to plant protection. There has been an increase in demand of talents in each profession in this new era, and the school is the base for cultivating talents [6]. The issue of providing talents to meet the needs of the society has become the focus of the education sector as well as the society which have not only impacted the students themselves, but also impacted the survival and

development of the school itself, and also the interests of the country. Industrial training is an important way to enhance the comprehensive quality of graduates in colleges. Industrial training improves their theoretical knowledge and allows them to apply their knowledge to their work and daily life, and improve their problem-solving skills and practical skills [7]. Students of Plant Protection course should not only, be familiar with the basic knowledge of various professions, but they should also be able to identify, forecast and control pests and diseases. In the past, the scope of practical courses was often narrower than the theoretical courses especially for industrial training and plant propagation season, thus causing a "flawed phenomenon". Such a teaching system restricts students' enthusiasm for learning, hinders their overall development and hinders the development of their abilities. The outdated internship system in colleges and universities cannot adapt to the needs of talent training in the new era, which leads to graduates not performing well in their jobs after graduation. Thus, the time taken for college graduates to adapt to the society needs to be shortened, and it is an important issue in the reformation of college education [8,9].

2. Problems in the training of students in plant protection

Although universities continue to increase their investment in education and teaching, the problem of the growing number of students and the shortage of educational funds remains prominent due to the continuous expansion of school size, which is the main reason for the decline in the quality of internship courses.

2.1. Experiments in Plant Protection course

Many experiments in Plant Protection revolve around verifications, such as entomology, plant pathology, *etc*. [10-12]. The content of the experiments mostly involves identification of insects and pathogens, and the preparation of conventional pesticides and determination of toxicity. Students only need to follow the operating procedures of the experimental instructions to successfully complete the experiments. Students can complete the experiment almost without thinking and this will cause development of dependence and passivity. Most students lack comprehensive and innovative large-scale experiments, and only a small number of students have mastered the basic experimental operation skills, as well as the use of common experimental instruments and apparatus, so few students can make a reasonable design of the experiment and make a correct analysis of the experimental results. It is evident that such demonstrative experiments are not conducive to the development of students' independent thinking and creativity.

2.2. The operating procedures of practical teaching are not standardized and too lenient

The existing practical classes of plant protection majors have practical syllabus, but there are no specific and operable standards in the implementation of experiments, internships and skills training. Lower teaching effect is not satisfactory [13].

2.3. Insufficient education funds

The production practice, teaching practice, professional skills training, industrial raining, and so on began to plummet due to insufficient funding, slow updating of teaching equipment and experiment equipment, insufficient drug procurement, simplification of teaching content.[14].

2.4. Substandard and incoherent practical training content in practice teaching base

Agricultural science training bases are not systematic, and some teachers and students are not willing to be involved in the front line of agricultural production in view of the traditional belief that working in a farm is lowly, resulting in a lot of practices being formalized or taken as a one-off activity. As a result, students can only browse pictures on the Internet or learn about the actual situation in the field during a certain period of time, which is not in line with the actual plant growth cycle.

3. Addressing the problems in the current practice teaching of plant protection majors with the "open" practice teaching mode

An "open" teaching principle should be adopted in teaching and management, from the construction of laboratories, the content of practical teaching, the time arrangement, the choice of location, *etc*., to cultivate students' ability to analyze and solve problems, as well as the ability to adapt to society, so as to adapt to the needs of society as early as possible.

3.1. Strengthen laboratory construction to develop students' innovative abilities

The economic partitioning around the college is clearly a natural herbarium. Students can collect a full set of pests and weed specimens according to the seasons and fertility period. This not only enhances the hands-on ability of students but also enriches the laboratory specimen storage to increase the teaching content for students' laboratory teaching [15]. At the same time, open teaching and research laboratories also encourage students to actively engage in hands-on practice, which is an important creative condition for developing students' hands-on skills and abilities. Scientific research and scientific studies of students are strengthened based on the development of quality, management, collaboration, marketing, competition, and innovation. Strengthening the construction of laboratories, transforming the functions of laboratories and establishing open laboratories is a hot spot for universities to carry out scientific research at present [16].

3.2. Practical teaching content highlighting integration and innovation

The content of the five main courses in Plant Protection is seasonal, articulated, comprehensive and innovative, reflecting their dynamic changes [17]. Seasonality refers to the selection of test materials, using general entomology, agricultural entomology and plant chemical protection at the time of the American white moth disease outbreak as test materials. Articulation means that each course should be non-repetitive, and there should be a complete teaching system between each section, so as to develop and improve students' comprehensive ability of analysis and problem solving through observation and practice of the same experimental object; Comprehensive means integrating multiple courses or multiple knowledge of a subject into one experiment to improve students' comprehensive understanding e.g. the experiment "Indoor fungicide toxicity test" includes Plant Pathology, Phytopathology Research Methods, Field Statistics and Analysis, and other areas of knowledge; innovation means that students should not only learn the basic practical skills, but also study the references, conduct experiments, data collation and analysis, essay writing, and so on, to truly identify, analyze, and solve problems from the experiments. On the basis of continuously improving the connectivity between classroom teaching and internship, the internship course can be improved. This enhances the comprehensive quality and innovation consciousness of students, which creates favorable conditions for the future employment of graduates.

3.3. Insist on the regularity of practical teaching

Four years of uninterrupted students from enrollment to graduation, from teaching practice, professional skills training, production practice, scientific research skills training, scientific research skills training, so that students to track the field production learning and practice. They have acquired knowledge of field diagnosis and identification of pests and weeds, prediction, yield loss estimation, integrated control, especially chemical control, *etc*. Teachers tailor their graduation designs to suit the students according to their research projects and their interests, and their content covers a wide range of production practice problems, greatly expanding the students' horizons and enhancing their overall understanding and application of knowledge.

3.4. Making full use of natural practice sites

In general, the development of natural practice bases such as nature reserves and botanical gardens rich in fruit trees, flowers, vegetables and crop resources around agricultural colleges makes the teaching of classroom theory concrete, productive, and readily available for on-site teaching. Besides, it makes abstract lectures vivid and graphic, which encourages students to combine theory and production practice to identify problems, and "getting to the bottom of the matter" greatly improves students' enthusiasm for learning and creativity.

3.5. Establish and consolidate off-campus practice bases such as agrochemical enterprises

We should take full advantage of the school's horticultural and agricultural test beds, and use the concept of "school-enterprise collaboration" to understand the needs of companies in advance and provide targeted training to students. Senior leaders of enterprises can be invited to give lectures to students, so that they can be exposed to enterprises, understand the operation mechanism of enterprises, and be prepared with knowledge and ability according to the needs of enterprises.

4. Teaching reform measures

4.1. Strengthen the curriculum system and improve the quality of teaching

Plant Protection is an important branch of agronomy, which is closely related to agronomy, seed science, plant science and other fields [18]. In the construction of the curriculum system, the basic knowledge provided should be expanded, the advantages of interdisciplinary subjects should also be fully utilized, and pay attention to the characteristics of plant protection. The main contents of Plant Protection course are as follows: symptom characteristics, pathogenic characteristics, occurrence patterns and integrated control of plants. From a traditional point of view, the control of various pests and diseases is needed, but in actual production, many problems can be solved by several aspects such as biodiversity and plant nutrition [19]. Therefore, Plant Protection, General Plant Pathology, General Entomology, Agricultural Entomology, and Agricultural Pathology should be taken as the core courses of Plant Protection, while Agronomy, Botany, Seed Science, Plant Nutrition, Plant Immunology, and Introduction to Plant Medicine should be taken as minor courses, abandoning the traditional "discipline-oriented" and giving full play to the important role of interdisciplinary in actual production. In addition, in order to broaden the students' knowledge, the course is designed to provide them with a wide range of knowledge. In addition, in order to broaden students' knowledge, some special elective courses can be added, such as adding new insecticide research and development, molecular plant pathology, molecular entomology, and more.

4.2. Strengthening the hierarchy of the faculty

As practitioners of education, university teachers are responsible for teaching, research and serving the society. The behavior, teaching style, academic characteristics and personal charisma of university teachers have a direct impact on students [20]. In the 2012 National Conference on Quality Improvement in Higher Education, the Ministry of Education proposed to strengthen faculty construction and develop more faculty training platforms. Among them, high-level faculty is the key to ensure the quality of higher education teaching and to promote the development of higher education business. As far as the current actual situation of our universities is concerned, most of the new lecturers have fairly high academic qualifications and theoretical knowledge, and have good academic research ability. However, they lack of actual practical experience in education which makes it difficult for them to complete the teaching of main courses in a short period of time, and it is even more difficult to go deep into the field to carry out guidance in production practice. In light of this, a bold exploration should be made in discipline construction and adjustment of teachers. The teaching mode that combines old, middle-aged, and young teachers should be implemented,

along with the concept of "the old (experienced) guiding the new (inexperienced)," while emphasizing on "student-centered" teaching. This fully utilizes the solid theoretical foundation and rich teaching experience of the old generation teachers. While in the process of practice and internship teaching, we can boldly attempt to comply with the concept of the "the old leading the new," while giving priority to the new and fully mobilizing the innovative thinking of new teachers. In this way, teachers can learn from each other and establish a high-level and high-quality teaching platform.

4.3. Reform the traditional teaching mode and introduce a variety of teaching methods

In addition, the teaching methods must be reformed. The traditional indoctrination and spoon-feeding teaching methods not only make students feel dull, but also give teachers a feeling of "one-man show". At the same time, interactive, inspirational, discussion, dialectical and other teaching methods should be applied, modern teaching instruments should be used to make the teaching content more vivid. The students' interests should be fully mobilized should be encouraged to actively participate in the class. The content of the teaching courseware is rich and diverse, which not only contains the basic knowledge points, teaching priorities, difficulties and frontiers of development, but also includes multimedia materials, such as videos, animations and pictures, so that students can better understand and remember what they have learned, thus making learning more fun, allowing them to learn to think and ponder, and can fully stimulate their enthusiasm.

5. Conclusion

In the context of a significant reduction in credit hours, the implementation of various reform measures improves the quality of teaching, enhances students' hands-on skills and autonomy, promotes their career development, as well as provides useful references for teaching reforms in other disciplines.

Disclosure statement

The authors declare no conflict of interest.

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