Research and Practice on Soil Science Teaching Reform

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Abstract: This paper analyzes the key problems that encountered in the teaching process of soil science, and puts forward corresponding reform measures for this problem: (1) Change students' learning attitude, stimulate their enthusiasm to learn the course. (2) Improve teacher's teaching ability, constantly update and enrich the teaching content. (3) Increase the types of experiments to meet the requirements of students from different levels. Through these teaching reform measures, to solve or improve the above teaching problems and achieve the teaching goal of soil science course. After the initial attempt of teaching reform and practice, it has been recognized and widely participated by teachers and students, and achieved good teaching results.

1. Introduction

Soil science is a science that studies the laws of the movement of soil substances and their relationship with the environment[1]. It is an important basic professional course for agriculture, forestry, resources and environment in agricultural and forestry colleges[2]. However, due to the characteristics of the curriculum and teaching requirements, there will inevitably be corresponding problems in the actual teaching process, which requires teaching units and teachers to take appropriate measures to improve the teaching quality and effect. Therefore, on the basis of summarizing the previous teaching work of soil science in our university and combining with the new ideas of teaching reform in colleges and universities, this project analyzes the current teaching situation and existing problems of this course, and proposes corresponding solutions.

2. The Main Problems in the Course of Soil Science Teaching

2.1 The Students' Attitude Towards Study is not Correct.

Soil science is a course that emphasizes both theoretical knowledge and experimental and practical skills[3]. Applicant according to the investigation and research of 216 students majoring in agricultural resources and environment from 2016 to 2018 find that, it generally does not pay attention to the experimental teaching of soil science. Do not seriously think about the problems and phenomena in the process of experimental practice, just can complete the experimental practice report. Experiments and practice reports are also stickle to form, only describing the mechanical experiment steps and practice process or copying the experiment content from textbooks, extremely lack the initiative to learn.

2.2 Teachers' Own Professional Ability is not Solid Enough.

For a qualified teacher, the abundant knowledge and ability and accumulation of teaching experience is the key[4]. However, in the actual teaching process, teachers do not pay enough

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attention to the importance of teaching tasks and do not actively improve their teaching professional ability. This is mainly reflected in the failure to read the relevant textbooks and tutorials of soil science and relevant literature carefully before teaching, so did not accumulate enough course knowledge. And didn't preparing lessons before teaching, or just prepared the content from the textbook, without introducing the latest scientific methods and technologies of this subject, and the teaching content is not rich enough to attract students and fully mobilize their enthusiasm.

2.3 The Teaching Contents and Facilities are out of Date, which does not Meet the Actual Needs of Production Development.

For a long time, due to the influence of teaching conditions, class hour compression and other factors, the teaching content of soil science course has not adapted to the level of discipline development, the production and social actual demand, and is far away from the international development trend. This course is an experimental course, for a long time, most of the experiments arranged were confirmatory content, lacking comprehensiveness, design, innovation and practicability, Even some of the experimental content is still using decades of unchanged instruments and equipment and original determination methods.

3. Reform Measures of Soil Science Teaching

In view of the above main problems in soil science teaching, this paper makes an in-depth study from the perspectives of students, teachers and university, and puts forward the following three reform measures to solve or improve the above teaching problems and achieve the overall teaching objectives of the soil science curriculum in our unit.

3.1 Correct Students' Learning Attitude, Improve Students' Learning Enthusiasm.

In view of the students' study attitude is not active, does not pay attention to the experiment teaching link, coping the experiment curriculum report and so on. This paper suggests that, first of all, teachers are required to properly explain the important role and status of this course for relevant majors in the teaching process, so that students can clearly understand that soil science is not just about mastering solid theoretical knowledge, more important, students should have the skills of soil, plant and fertilizer analysis and operation, and improve their decision-making and reflection ability when facing practical problems. Second, from explaining the history of soil science, the industry research hot spot, teachers and past students to participate in the teaching and scientific research achievements to mobilize students' interest, arouse their curiosity, describe work related industry knowledge and talent competition influence on the vital interests of the students, let the students have the initiative from the heart, change passive learning into active learning.

Actively organize and encourage students to participate in research and practice activities, stimulate students' interest in experimental learning. Through the investigation and research practice of agricultural production, students can get in touch with practical things and get more intimate perceptual materials, which is conducive to improve students' interest and enthusiasm for experimental course content. In the summer vacation of 2016, I organized students of relevant majors to carry out research and practice activities that is let students during the summer vacation to carry out investigation about the health conditions of soil, water, air, plants and local residents in their hometown, at the same time, let students to collect soil and plant samples from all over the country for their analysis and determination in the experimental course at the beginning of the term. Under the guidance of teachers and experimental technicians, students conduct determination, analysis and data processing of taken samples, and according to the results of the determination, write the analysis report on the physical and chemical properties of local soil and the nutritional status of crops, and further evaluate the local soil quality and crop production, put forward suggestions that improve soil, increase yields, and recommend cropping systems. Inspire students to analyze the existing problems of the experimental samples by combining the local production conditions with the environmental conditions, cultivate students' skills in using experimental contents, methods and advanced instruments, avoid the disadvantage of copying the experiment

report with the experiment content and result. Meanwhile, since the collected samples come from different regions and environments, students by exchanging and talking about the measurement results can learn about the soil types, agricultural production and planting systems, field management measures, soil, water environment and air pollution levels from different regions, cultivating students' ability to analyze and solve problems independently. In addition, while writing the soil evaluation report and improving suggestions, the students also effectively train their innovation ability in applying the knowledge of this course to practice.

3.2 Improve Teachers' Teaching Ability and Constantly Update and Enrich the Teaching Content.

Constantly improve the quality of teaching staff. The quality of teachers is the key to guarantee teaching quality[4]. Good teaching patterns and methods need to be implemented by the teachers who with high quality. First of all, the teachers of this course should love teaching, have the spirit of dedication, have a strong sense of responsibility, and be able to patiently answer students' questions, and master the content and methods of each experiment; Secondly, the development of science and technology makes the experimental instrument more precise and complex, and the experimental technology is developing towards the direction of multi-disciplinary interpenetration. Teachers should take the initiative to accept and learn new knowledge and technologies, keep abreast of the frontier trends of the subject, and update and supplement them into teaching.

Enrich the content of the teaching materials. The contents and methods of soil science experiments teaching materials have not changed for many years. This limits the development of students' thinking and restricts the formation of students' creative consciousness, which is not conducive to train students' ability to comprehensively analyze and solve problems. In order to improve the teaching quality of experimental course, there should not only have a high quality team of teachers, but also should have appropriate teaching materials. In order to strengthen students' using hands and innovation ability, should timely revise the original experiment content, adopt the current advanced research methods and means that used in this subject into the experimental teaching materials, reduce the confirmatory content, increase the content of design, strengthening the combination of theory with practice, increase the practicability, especially should combine with the subject development and national needs. In the course of experimental teaching, we should not only pay attention to the accuracy of the experimental results, but also should increase the analysis content of the experimental results.

3.3 Increase the Types of Experiments to Meet the Requirements of Students of Different Levels.

There are three kinds of experiments[5]: ① Cognitive experiment, that is confirmatory experiments, such as observation and measurement of soil profile, rock and mineral samples, soil physical and chemical properties determination;②Comprehensive experiment,that is soil science, environmental monitoring and other courses have both theoretical and technical multi-project comprehensive experiment;③Innovative experiment,That is, combining teachers' scientific research, providing laboratories , independently designing and carrying out innovative applied technology research experiments for college students. Professor wang yiqui, vice President of Peking University, said at the national university laboratory work seminar: "The basic purpose of experiment is to learn the methods of experimental measurement, scientific thinking and basic research methods of the discipline, which is the most basic. Verification should be placed in a relatively secondary position. If verification is put in the main position, it actually reduces the position of experiment."

The methods involved in the soil science course are derived from national standards, industry standards or local standards, the experimental conditions are quite strict, some students don't care, but others are curious. If not under certain conditions, what will happen and what will be the impact on the experimental results. For this situation, increasing design experiments. For example, for the determination of available phosphorus in soil, in the determination of molybdenum-antimony

anticolorimetric method, the acidity and basicity of the colorimetric solution are strictly required. There are two classes of agricultural resources and environment major of 2016 in our university, a class averages 35 students, plan to divide the students into five groups, each group have seven people, different groups measured available phosphorus at different pH values. After the determination, discuss and analyze the determination results, and draw a conclusion. Through their own participation, students are expected to have a good grasp of the available phosphorus determination conditions, and the quality of teaching is improved.

Most traditional soil science experiments are confirmatory. In the design of the reformed experimental course proposed in this paper, considering the different training purposes of students and the production practice, under the existing conditions and the number of class hours (12 class hours), the types of experiments are increased from a single confirmatory experiment to comprehensive experiment, design experiment and innovative experiment.

4. Summary

In view of the problems in the teaching process of soil science, this paper puts forward three teaching reform measures. After the initial attempt of teaching reform and practice, it has gained the positive recognition and extensive participation of teachers and students, and achieved good teaching results. First, it stimulates students' interest in learning. Under the patiently guidance of teachers, cultivated students' ability of independent experiment and increased communication between teachers and students. Students learn from each other, increased the friendship between students; Secondly, it increased students' interest in experimental courses and solved the problem of doing experiments passively in the past. Thirdly, in terms of experimental operation, students are no longer unfamiliar with some new precision instruments, and their ability to analyze experimental results, process data and summarize laws is significantly improved. In the whole teaching process, not only improve students' practical ability, but also cultivate students' ability to further understand and synthesize textbook knowledge and apply it to practice. Fourthly, teachers put more energy into exploring, practicing and perfecting this teaching reform method. In this process, its teaching ability has been greatly improved, teaching contents and methods have been constantly updated, and it keeps up with the trend of subject development, which is more appropriate to the actual production needs. Teachers can guide students to find problems from practical production, and generate interest in solving problems, so that students can take the initiative to learn. In addition, through experimental practice verified and digested relevant theoretical knowledge to achieve the purpose of improving teaching effect.

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