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Exploration of improving teaching quality of an agricultural professional - Postharvest biology and technology of horticultural products

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ABSTRACT

Aiming at the common problems existing in our agricultural professional course teaching including low learning motivation, obsolete teaching materials, rigid teaching methods, weak practical and innovation ability of the students. In this paper, we take “Postharvest Biology and Technology of Horticultural Products” course as an example to discuss the comprehensive measures to improve the course quality, which have achieved significant results. © 2014 Trade Science Inc. - INDIA

KEYWORDS

Postharvest biology;
Course teaching;
Teaching quality;
Teaching method.

INTRODUCTION

Postharvest Biology and Technology of Horticultural Products is a part of required backbone course for senior students of horticulture and food science majors in agricultural universities, tightly combining theory with practice. This course systematically describes in theory the physiological and quality changes and mechanism of fruits, vegetables and flowers after harvest; extensively introduces the technologies of postharvest horticultural products processing, storage and transportation as well as marketing. With the rapid economy development and the improvement of people's living standard, the demand for high quality fresh fruits and vegetables keeps increasing. Therefore, there is urgent need for a large number of high-quality horticultural postharvest technology talents that not only understand theoretical knowledge but also master the tech-

nology. In recent years, the number of college graduates significantly increased (exceeding 6 million in 2009; nearly 7 million in 2013)^[1]. Under these circumstances, one serious problem is the employment and the other is that the traditional teaching modes of current postharvest technology courses have been unable to meet the social demand of high-quality talents. Similar problems have been found in many agricultural major courses^[2-4].

There are several main problems restricting the teaching quality of agricultural professional courses: (1) Obsolete teaching materials. The textbook is the important basis to ensure the quality of teaching, but current teaching material construction and publishing system for agricultural specialty in our country is seriously lagging behind, resulting in the slow update of teaching materials. Taking “Storage and Transportation of Fruits and Vegetables” published by Chinese Agricultural Press as an example, the

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first edition was published in 2002, the second edition in 2008, and the third edition scheduled to be published in 2014, which means that the textbook is updated every six years. Modern science and technology change rapidly, however, the teaching materials update slowly, obviously lagging behind the needs of economy development. For example, in recent years, new technologies for cold chain logistics, distribution, and new packaging materials for fruits and vegetables have developed very quickly, but these contents are rarely introduced in the textbooks. (2) Limited traditional teaching methods. The traditional teaching methods are simplified and rigid, without effective interactions between teachers and students, basically being the cramming style. In class, the students passively take notes, having very little discussion. Before the exams, the students usually require the teachers to provide with teaching courseware, learning notes by rote, which are largely forgotten after the exams. (3) Poor learning initiative of the students. Due to the rigid teaching materials and methods, also a misleading exam-oriented education model, the enthusiasm of most students for learning has been adversely affected. The learning initiative of some senior students for the professional courses is low; they seldom actively think and participate in class discussions. Such a learning mode can only cultivate exam-oriented students. (4) Weak practical ability. Due to little attention to experiments and practices, with limited experimental facilities, the students' practical ability is not very strong. (5) Lack of innovation consciousness. Most students are accustomed to the existing book knowledge, lacking the courage to explore and innovate, thus fail to meet the requirements of being innovative talents for economic construction. How to further realize the importance of agricultural professional courses, change traditional teaching mode, truly carry out effective combination of teaching and practice, and to cultivate qualified personnel to satisfy the needs of the society, will be an important topic for a long time. Therefore, the purpose of our study is to investigate these common problems and explore ideas and methods to improve the teaching quality.

EXPERIMENTAL SECTION

To improve teaching quality of the courses is a systematic project. We here study a series of comprehensive measures to carry out teaching reforms, including stimulating the learning initiative of the students, strengthening the construction of teaching materials, combining traditional teaching methods with modern teaching techniques, promoting practice and cultivating students' innovative consciousness.

Stimulate the learning initiative of the students

We used a variety of methods to stimulate students' learning initiative. We introduced where the students went for work after graduation, mainly including fruit and vegetable enterprises, export companies, research institutes, postgraduate institutes, etc. The social demands for horticulture graduates are strong, but graduates are required to have not only theoretical knowledge but also practical experiences. Having a good command of professional courses can lay a good foundation for the future development of graduates. We also set successful examples of former graduates to further arouse the learning initiative of the students.

Update teaching material contents

To solve the actual unbalance problem between less updated textbook and rapid development of science and technology, we speeded up the update of teaching material contents, introducing latest research advances and literature updates, so that the students could master the latest development trend of the technology.

Combine different teaching methods

We changed traditional teaching methods where teachers "chalk and talk" in class, while students take notes or make PPT, into a combination of modern teaching means and traditional teaching methods, integrating heuristic teaching style, to stimulate a strong desire of the students for knowledge. We also established teaching websites to provide students with learning references and a self-learning platform, and also made a platform of teaching interaction and discussion between teachers and students.

Strengthen practice teaching

According to the syllabus requirements, we offered more experiment courses, including an inquiry-based course “Comprehensive Experimentation of Storage and Transportation of Fruits and Vegetables”, in order to improve the students’ ability in laboratory. We organized students to participate in the practical operations of preservation and logistics of postharvest fruits and vegetables at practice teaching bases, thus, cultivating students’ practical ability.

Cultivate students’ innovation consciousness

During the topic discussion, we guided students to innovate, challenge existing theories and technologies, and encouraged them to raise up own innovative views. We also designed innovative experiments; cultivating students’ innovative spirit and scientific attitude, made the students be engaged in scientific research via organizing them to actively participate in the competitions of science and technology activities.

RESULTS AND DISCUSSION

Students’ learning initiative has been greatly improved

Einstein once said ‘interest is the best teacher’, and Bruner, as a famous American psychologist, also thought that the best learning motivation is the students’ intrinsic interest in knowledge itself. Interest is the driving force of learning and important premise to learn professional courses set for high grades. We analyzed why high grade students lacked enthusiasm for, or even hated professional courses and listed the main reasons as: (1) Students think that these courses would not help their future career after graduation, or they are to be engaged in other industries; therefore, most students focus on various certificates or CET 4 & 6, without any interest in the professional courses; (2) They are busy with postgraduate examination, hoping to change the fate via get a graduate degree of a famous university; (3) They are busy looking for a job. Senior students face practical problems finding a job after graduation,

struggling to cope with various recruitment events and job interviews; (4) Passive learning style. Some students feel high pressure to learn professional courses, without any review or preview, which adversely impact the effect of professional course learning. As teachers, we should not complain or criticize students for their low interest in learning, but need to ponder and take a series of measures to guide students to improve their interest and learning initiative for professional courses.

For stimulating the enthusiasm of the students, we mainly took the following measures: (1) We made students fundamentally realize the importance of the professional courses. For those preparing for postgraduate examination, we corrected their learning attitude, i.e. a postgraduate diploma does not necessarily ensure a good job. We emphasized on that undergraduate professional courses could lay a solid foundation for graduate education. We also set examples of former excellent graduates with solid undergraduate curriculum knowledge; most of them were admitted by famous universities in USA and France, etc, and successfully won master, Ph.D degrees and obtained postdoctoral research opportunities, indicating that a good command of undergraduate curriculum knowledge is indispensable. We introduced the significance of science and technology of horticultural products since the standard of living has been greatly improved in China and the demand for fresh fruits and vegetables has been keeping increasing. However, the problems of preservation technology usually lead to a loss of 25%~30% with an annual loss of billions of RMB. We also introduced students who were engaged in fruits and vegetables preservation industry and trade after graduation, and made a successful career and important contributions to the society. They said with deep feeling that the professional courses did lay a good foundation for their career development. (2) We improved teaching methods. We changed traditional passive teaching to interactive teaching and made active learning atmosphere in class. Test results have shown that students’ performance has been improved significantly, through improving their learning initiative.

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Update course contents for students to master more new professional knowledge

The teaching material content has an important influence on the teaching quality. Due to slow update of our textbook, which usually takes 5-6 years, teaching materials have lagged far behind the rapid development of science and technology, some of which do not adapt to the needs of economic development. For example, in recent years, cold chain logistics technology, packaging and new materials, biological antistaling agent in fruits and vegetables have been more widely used in postharvest processing and circulation. However, the textbooks to introduce these new technologies are quite limited. Therefore, through the publication of new teaching materials to introduce research progress at home and abroad, and the introduction of teachers' achievements in their scientific research, we updated and added some course contents: (1) research advances on the mechanism of quality control of fruits and vegetables; (2) characteristics and usage of fresh-keeping packaging materials, such as microporous membrane and antifog film; (3) usage of low carbon, green and safe preservative and physical preservation techniques, e.g. biological antistaling agent, ethylene receptor inhibitor, new fruit wax, heat treatment, etc; (4) cold chain logistics technology. Starting from the places of origin (i.e. orchard, garden), the entire process of seamless cold chain circulation and monitoring for fruits and vegetables contains rapid precooling at harvest, cold storage preservation, transportation and sale at market.

Combination of traditional teaching method and modern teaching means

We changed the traditional rigid teaching style, where teachers teach lectures while students write notes, to modern education means. We emphasized on the stimulation of students' strong desire for knowledge, combined theory with practice, and put forward interesting scientific questions about the preservation of fruits and vegetables, then gradually guided students to analyze and think, thoroughly discuss on the essence of technology and the principle of scientific problems, and then the solutions to the problems. We focused on the analysis for the difficult and key points of the curriculum, with interac-

tive teaching and setting curriculum related subjects to allow students to search for information and make presentations in class. These have greatly stimulated the learning interest of the students, revived the class atmosphere and improved teaching effect in class.

The modern network information technology is an important means to improve the teaching quality of professional courses. Taking the advantages of teaching references and resources that we have accumulated for years, we established the "Storage and Transportation of Fruits and Vegetables" teaching website. We set up ten resource databases, providing teaching courseware, experimental guidance, exercises and online tests, reference library, question library, case study, network resource library, pictures, video, web links and other resources. All of this offered rich teaching resources for teachers and students to share, and provided a good platform for students' self-learning.

Students' practical ability has been significantly improved

Postharvest Biology and Technology of Horticultural Products is a course with a close link between theory and practice. Students are required to have a strong practical ability. By strengthening experimental teaching and practice in the enterprises, we improved the students' experimental skills and practical ability. In a routine experiment class, teachers prepare the experimental reagents, instruments and materials; students just do some simple operations and write reports. Therefore, the students only know the experiment process but not the underlying principles, leading to a poor laboratory practical ability. We have carried out a reform on both the experimental teaching contents and methods by setting up an inquiry-based "Comprehensive Experimentation of Storage and Transportation of Fruits and Vegetables" to encourage the students to design the experiments, using what they have learned on postharvest physiology and biochemistry, chemical analysis and other knowledge, from preparing reagents to writing experiment reports, all completed by themselves; teachers just give some guidance. This comprehensive experimentation has ten experiments, including respiration rate determination, ethylene

production rate, enzyme activity, chemical composition, firmness measurement, critical temperature of chilling injury, vacuum precooling and ripening control, etc. These experiments have made the students master conventional measuring and test methods via the use of large-scale instruments of the experimental platform, greatly enhancing the enthusiasm of students in active learning and laboratory practical ability, so have been well received by the students.

In order to improve the students' practical knowledge, we organized students to visit university-industry cooperation bases and had internship at the forefront of production, took part in practical processing operations for fruits and vegetables by themselves, learned fruit and vegetable exports and domestic trade, logistics, marketing and preservation techniques, which significantly enhanced the students' comprehensive quality and practical ability. Most students said that through the internship at the production bases, they gained a deeper understanding of the course materials and recognized the contribution of their major to the society, which further enhanced their sense of social responsibility and improved their competitiveness and actual work ability.

The innovation ability of the students has been enhanced

Innovation is of great importance for the education especially higher education. Our students are good at taking exams, however, the training of their innovation ability has been largely overlooked. In order to cultivate the students' innovation ability, we guided students to innovate and encouraged them to put forward their own innovative views in class. We also set up innovative experiments, cultivating students' innovative spirit and scientific attitude, to guide and enhance students' awareness of innovation to actively participate in the scientific research. We organized students to participate in the "Guangdong College Student Extracurricular Challenge Cup" competition and they received a reward. Two undergraduate students were funded by South China Agricultural University undergraduate innovation project, and they put their research achievement applied for a patent for invention as "a litchi fruit fresh-keeping method".

CONCLUSION

In our agricultural professional course teaching, there are common problems including low learning motivation, obsolete teaching materials, rigid teaching methods, weak practical and innovation ability of the students. These problems deserve relevant departments and teachers and students to pay great attention to and solve.

The improvement of the teaching quality of professional courses is a systematic project. Our practice has shown that a series of comprehensive measures can significantly improve the teaching quality of professional courses, including stimulating students' learning initiative, timely updating curriculum contents, combining traditional teaching method and modern teaching means, strengthening practice teaching and cultivating students' innovation consciousness.

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