

Discussions on Teaching and Learning of Agricultural Mechanics' Course

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Abstract. Agricultural mechanics is one of the most important professional courses for farm machine specialty. With the characteristics of a wide range, content quick updating and comprehensive and so on, we should establish the appropriate content system of agricultural machinery course to meet the social development and train high quality innovative talents by reasonable teaching methods and means. In this paper, we discussed the teaching reform of agricultural mechanics from the quality of teachers, the selection of textbook, teaching content, and teaching methods based on the nature, teaching-features and functions of the agricultural mechanics curriculum. On the other hand, how to learn agricultural machinery was also discussed.

1. Introduction

According to the regulations of Ministry of Education on universities professional curriculum modification, engineering professional training programs at Hainan University have also been adjusted accordingly. The main training objectives are to meet the needs of social development in the new training program in spite of the professional courses teaching time substantially reduced. To meet the needs of reform, agricultural mechanization and automation in teaching plans, course content, teaching methods and assessment methods have also been modified accordingly. Agricultural mechanics are among the most important specialized courses in agricultural machinery specialty, which mainly introduces various basic types of agricultural machine, basic structure, working principles, performance parameters and field experiments in the agricultural production process. It is extremely vital to agricultural students in future work. It is also a main criterion about students' mastery of specialized knowledge and professionals skills. However, the teaching hours significantly are decreased and content are updated constantly. Therefore, it is a challenging task to make students master more information and the course content within a limited time. The authors think the following aspects should be adjusted and improved in the teaching in order to obtain better teaching results.

2. Discussions on the teaching of agricultural mechanics

2.1 Teaching target

In order to adapt the social development and the progress of science and technology, university engineering education increasingly focused on cultivating innovative talents. The agricultural mechanics is the main professional course which is a model of higher education courses in the organic combination of theory and practice. It has an irreplaceable role in cultivating students' practical capacity and improving students' creative thinking. The importance of agriculture machinery course becomes more obvious in the guiding ideology and environment of "national innovation, the highly entrepreneurial". Therefore, the teaching objective of the program is mainly reflected in improving students' comprehensive quality and innovative ability.

2.2 Textbook and teaching contents

The content of textbook not only describes the existing systematic knowledge and concepts, but also should introduce all sorts of new ideas and new insights, and reflect the new dynamic

development of the subject. An excellent textbook should play a role for a teacher to improve the teaching. There are two typical textbooks: one is “agricultural mechanics” textbook, edited by Beijing Agricultural Engineering University, whose chief contents are divided into two parts: the first part mainly introduces agricultural tractor, tillage machinery, paddy planting machine and plant protection machinery; the second part mainly introduces harvesting machinery, seeding machinery, sorting machinery and drying machinery. The other “agricultural machine” textbook, edited by Li Baofa, whose front part introduces the structure and principle of farm machine and work processes, the latter part including agricultural machinery design concept, computational method, test methods, instrumentation and data processing, etc. We choose the latter as a main teaching material according to the actual situation and requirements.

Teaching content should not only reflect the characteristics of the course, but also concentrate on training objectives to meet the need of training high-quality talent. A teacher can't expand all professional knowledge in the classroom because plan teaching hours are cut down substantially. It is somehow difficult for a teacher to make sure all students understand the whole farm machine contents in restricted hours. According to the previous teaching effectiveness survey, we found that it is a painful exercise for most students to learn the theoretical analysis and mathematical modeling, such as agricultural wheel force analysis, tractor traction science, fan theories, traditional plow, disc harrow, rotary tiller, but they look like interesting in planting machinery, harvesting machinery, transplanting machinery and modern farm machinery technology. Therefore, we generally take the following teaching exercise: abandoning abstract theoretical knowledge, just to introduce in brief some national agricultural engineering development status and traditional farming machinery plow, disc harrow and rotary cultivator. And to take an emphasis on the harvesting machine, seeder and modern machinery design way, etc. We will increase some contents of new technologies and new equipment of modern agricultural machinery when analyze the traditional agricultural equipments knowledge in class, such as precision agriculture, GPS in agriculture, sprinkler irrigation technology, vegetables transplanting machinery and agricultural robotics. We also add local characteristics agricultural equipments such as some machines with rubber, bananas, sugarcane, cassava, sisal, pepper and guava to the teaching exercise. Moreover, we always encourage students to choose "agricultural machinery", "agricultural engineering" and other professional journals as an essential reference to expand their professional horizons.

2.3 The quality of professional teachers

It plays a very important role for a teacher in the process of acquiring knowledge of students. As a teacher of agricultural engineer. firstly, he should have a strong sense of responsibility and mission, and could understand teaching to be not just a career, but also to cultivate the society of highly qualified personnel. Secondly, agricultural mechanics is a very strong comprehensive curriculum. Therefore, a teacher must master basic courses such as mechanical drawing, mechanical principles, mechanical design, theoretical mechanics and electrical circuit as well as specialized courses, such as agronomy, new agricultural technologies, agricultural mechanization management, tractor and biological engineering and so on. Thirdly, a professional teacher must know well the basic skills and operating procedures of agricultural production experiments, If conditions allowed, a teacher should regularly attend all kinds of academic conferences and farm machine and equipment exhibitions to obtain the latest technological developments and trends in the profession, to enrich and broaden his knowledge.

2.4 Innovation of teaching methods

1) Improving of theoretical teaching

Currently we have carried out the teaching methods of questions and inspired combination instead of the previous traditional teaching ways after years of exploration and summary, which means the teacher will first set up some key questions, and students need to learn correlative contents by themselves in a few minutes, the teacher will explain the ones that students cannot understand, and students will be encouraged to express their different views about teaching content and participated in class discussions. Due to the rapid development of the technology of multimedia teaching, we use a large number of video teaching to substitute the physical demonstration of lacked

farm machines in class, which can also play a similar teaching effectiveness, we also have a attempt by taking special lecture methods which is to arrange some machinery professional experts and scholars to have some thematic teaching, which can improve students' study interest in a certain field and also make students learn more agricultural knowledge.

2) Change of practice teaching

Agricultural machinery experiments are very important curriculum parts, because they are possible to visualize abstract theoretical knowledge and concrete, to better promote the students to understand the agricultural theoretical knowledge, and also to upgrade exercise practical skills and to solve problems ability. Reasonable experimental design and teaching practice often play a multiplier effect on teaching. Therefore, we carried out experimental teaching by the test equipment of mechanical principles and mechanical design innovations laboratory, conducted using a variety of farm machinery agricultural machinery performance testing, and used waste agricultural products to train students for installation and removal capability. It also requires students to make 3D models and three-dimensional animation by three-dimensional graphics software. Such teaching way is lively easy to understand and obvious effect.

3) Renovating of product exercise

Production practice not only can train student's actual operation ability and hard-working spirit, and still can cultivate students' creative thinking and team-work. The first two weeks of production practice, we will do some skill trainings and exercise on how to use the plow, disc harrow, rotary tiller, paddy and wheat combine harvester, paddy transplanting machine, ask each student can practice independently solve all sort of problems in the practice, such as farm machinery articulated, tractor maintenance. And the last week, we will arrange students to visit some farm machine companies to understand the main products, development, social status and trends of concerned enterprises. That can not only train the skills of operating basic farm machines, exercise hard-working ability, but also broaden students' horizons and enhance the team spirit of mutual collaborating.

4) Construction of network teaching

With the reform of educational programs of universities and training methods, classroom time is shortened. Therefore, classroom teaching cannot be completely relevant content textbooks teach complete, which easily lead to agricultural teaching content is unsystematic, and students' knowledge is not comprehensive. Therefore, construction of relevant network teaching is very necessary, because the network is very flexible teaching way, students can easily learn any free time. Therefore, we have been actively exploring and trying to network teaching, and has achieved some success.

5) Updating of examination form

Agricultural machinery course examination was a final exam accounted for 70%, usual performance is accounted for 30% (including the experimental operation and experimental reports, etc.) in the past, which resulted final exam from final results of the course, and to a certain extent, the course examination cannot completely embody comprehensive mastery of students on this course, which would frustrate the positive attitude to taking part in the practice of farm machine. So from 2007 up to now, we have changed the way of farm machine examination, the final exam performance is accounted for 50%, usual performance is accounted for 20%. Class discussion, experimental operation, experimental reports and classroom performance are accounted for 30%. Agricultural production practice alone results in mind, and examinations in accordance with the relevant rules of Hainan Farm Tractor driver test performed. The students are becoming very positive on practice. Lab reports and the quality of course articles have also become greatly improved after changing examination.

3. How to learn agricultural mechanics

The teaching effectiveness is not only related with the teaching level and teaching methods, but also with the attitude and methods of student learning. As a student of agricultural machinery

specialty, We should make it clear how to master the key theoretical course and get the product practice skills. The following parts will be considered.

1) Keeping a correct viewpoint

First of all, it is necessary for every student to hold the correct cognition and attitude to agricultural machinery. To eliminate the misconceptions and prejudices of agriculture professional, we must keep an incentive behavior to obtain the desired effect in the study. Agricultural mechanics should be one of the principal special courses. It is vital for each student to work and research in the future, and we must realize it and continue to make improvement on the course.

2) Previewing pre-course and selecting reference books

Students firstly must grasp the flowing courses: mechanical drawing, mechanical principles, mechanical design, electrical engineering, and even management of agricultural mechanization, bioengineering, ergonomic, agriculture and introduction.

In order to broaden students knowledge views, the teacher should encourage students to learn the latest developments of the agricultural engineering discipline and to acquaint the status and trends of agricultural machinery development from a variety of ways, also advocate to read more related journals with the agricultural machinery industry, such as the journal of agricultural machine, the journal agricultural engineering, agricultural mechanization research, Chinese agricultural mechanization and modern agriculture research.

3) The theoretical study

Agricultural mechanics is one of most complex course comparing other professional courses, the students need to preview textbook before class, take notes and think seriously in the class, and sometimes they may also question and express their view, to complete the teacher assigned the task after class.

4) Methods of production practice

Practice is the criterion for validate truth, agricultural production practice and experiment is the most direct way to test the content of classroom lectures, the students must carefully listen to the teacher's explaining, carefully observe the teacher's operations, completely familiar with the basic skills, on the other hand, the students must strictly abide by the rules, put safety first and keep to communicate with teachers during operation.

4. Summary

The teaching contents, teaching methods and practical contents of agricultural mechanics must be updated from time to time with continuous development of the social and progress of science technology, Based on the scientific concept of development and social needs, the universities can completely cultivate high-quality professional students by taking modern teaching means and choosing reasonable methods.

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