

Research on the Assessment Reform of Digital Signal Processing Course

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Abstract: The course of digital signal processing is characterized by a variety of transformation formulas and a large number of mathematical derivations. It needs many courses such as advanced mathematics, signal and system as prerequisite courses. It is also very practical and essential for the employment of students. It requires the theory and engineering application ability. Based on these characteristics, this paper puts forward the reform of the four in one multi-dimensional comprehensive assessment method of oral test, weekly quiz, experimental test and open test, and adds MATLAB simulation experiment. Tracking the actual teaching experiment data of students' postgraduate entrance examination and employment through teaching experiments, which reflects the good teaching effect of assessment reform in practical teaching application.

1. Introduction

In recent years, electronic and computer engineering education engineering education has undergone important changes due to the influence of employment orientation. Both in the course content and teaching methods, as well as the teaching platform design has produced huge changes. On the one hand, with the importance of practice, the teaching focus has been shifted significantly to the design of digital systems and the use of digital signal processors for digital filter design, and on the other hand, the importance of assessment makes the theory of the examination unavoidable. Since the early emergence of computers, learning through computer-based environments has increased significantly, the teaching value of computer and online education tools such as online classes, and the effectiveness of simulation experimental software has been demonstrated in teaching practice and educational experience^[1]. However, the conservative way of curriculum assessment, as a baton, inevitably restricts the application of new teaching methods and teaching practice in the teaching process, among which the typical one is the assessment method of digital signal processing course.

Digital signal processing course is a professional course of information and computing science major in WIT (Wuhan Institute of Technology), and it is offered as a communication course in the School of Electrical Information. Because it gets early to compute a molecule of mathematics, so it has certain mathematical properties, abstract concepts and needs more reasoning Fourier transform formula. The course is offered during the junior year, because the course requires calculus, Fourier transform and etc as the basis. At the same time, the development of digital economy has made for the increasing number of majors requiring digital signal processing, such as voice signal processing, natural language processing, digital image processing, biomedical signal processing and other majors. These related courses require students to have practical operation in mastering digital signal processing. Therefore, MATLAB-based digital signal processing experiments, or Labview-based experimental courses are added to the current curriculum system. Since digital signal processing plays a core role in connecting the preceding and the following in the whole curriculum system, it requires students to understand and master the basic concept formula, but also to have strong application ability, which makes this course a more difficult course to learn, and also brings difficulties to the assessment design. Digital signal processing course problem is also the current

university engineering course common problems, strengthen the whole process of course teaching tube combined with the characteristics of mathematical signal processing, combining with Wuhan engineering university college information and computing science students, targeted to the course of examination method and examination content reform, teaching effect reflected in student employment and one's deceased father grind has significant improvement.

2. Present Teaching Environment in WIT

At present, colleges and universities generally use the score statistics system for the examination results management, generally only reflected in the final examination stage. Although it pays attention to the close combination of theory and engineering application in the process of teaching and assessment, there is still no management system to track students' daily learning situation and daily tests throughout the whole process. General teaching affairs system performance management is used 30% at ordinary times, 70% final exam, including result is given priority to with attendance and homework attendance work, attendance basically test name registration, homework now has a lot of reference materials, students can search through the network resources, many students directly on the Internet answer to finish the homework, so homework and attendance is difficult to reflect the students learning status at ordinary times. In the final exam, students all focus on dealing with the exam, memorizing formulas and doing questions. At the end of the exam, they may not know the context of the course, so it is difficult to mobilize students' learning initiative and initiative.

Especially in the current Internet era, education managers will also into control the behavior of college students classroom practical mobile phone. on the one hand, the practical mobile phone makes thinking fragmentation, is not conducive to teachers 'teaching and students' listening, on the other hand, the temptation in mobile phone makes students difficult to keep attention in need of logical focus thinking course. Although the teaching administrators have designed the cloud classroom^[2], Rain class^[3]. Such novel ways to integrate mobile phones into the teaching process, but their effectiveness can not be verified due to the relatively short practice time^[4-7]. Among them, cloud classroom research shows that although students' course performance has not changed significantly, there is still a gap that "cloud classroom" in practical courses is not a preferred teaching scheme due to the gap between online learning effect. In addition, in the practice process of rain classroom, students believe that rain classroom has the effect of improving classroom learning effect in general. The main reason is that rain classroom is limited by the slow Internet speed and the proficiency of teachers and students 'operation, and the stability of classroom operation seriously affects teachers' teaching enthusiasm and students' learning patience. In particular, the use of mobile phone interaction before or after class is too much or too complicated, which will add some extra workload to teachers and students. Generally, students will look at their mobile phones after completing the interaction to divert their attention, which poses a greater challenge to improve students' interest in learning. How to adapt education to The Times is an important topic in front of educators. Among them, the importance of evaluating the students' learning results and the teaching results of the teachers in the curriculum examination is particularly prominent.

3. Reform of Examination Methods in WIT

Curriculum examination is an effective measure to improve the quality of teaching, is also the important means of evaluating students are relatively fair and standard course course management, and to balance the characteristics of the course, can stimulate students 'interest in learning, arouse the enthusiasm of students' learning, so the course examination and classroom teaching together constitute the teaching quality guarantee system^[8-9]. According to digital signal processing course teaching characteristics, design the oral test and peacetime test link, the final score constitute "oral + written + usual test + ordinary results" evaluation method, including oral accounted for 10%, written test accounted for 60%, usually test accounted for 10%, usually accounted for 20%, the

basis is that oral test can avoid students cheating, can strengthen students for later professional employment interview experience, usual test can strengthen the students' teaching effect assessment, relative to the final exam spread pressure. At present, the School of Electronic Information Engineering of Changchun University^[4] Similar design is adopted, and good teaching results are achieved. However, for information and computing science majors, students tend to learn mathematical theory and algorithm design, and the number of teachers is small, and the teacher strength is insufficient. Therefore, the oral test and peacetime test is added in the assessment design, and the computer programming test is abandoned.

3.1. Arrangement of Oral Test

Teaching is face-to-face communication, but face to face exam has certain pressure to students, so oral test can better improve students' learning initiative and positive thinking ability. At the same time there are still limitations, such as more teaching human resources. The teachers' knowledge level is higher, test continuation time is longer accordingly. However, digital signal processing courses often appear in student employment interview questions because of their common-sense knowledge. For example, to interview for communication jobs, you are often asked about the sampling theorem, fast Fourier transform algorithm, parity signal and other related questions. Although these questions have reference answers, the bonus points are different because each student's understanding is different. When students are asked about the ideal low pass filter, the mathematical foundation better students will answer is a step function, and imaginative students will answer is a ladder, and students will answer the ideal low pass filter in reality, and give the ideal low pass filter Butterworth filter construction method. Each answer reflects the students' perspective and depth of knowledge understanding. These things can not be reflected in the written examination. And in the oral test process, students can be familiar with the technical interview process, and master the communication skills of the interview.

In the design process of the digital signal processing interview in the School of Mathematics and Physics of Wuhan Engineering University, the oral interview is arranged after the end of the course and before the final exam. First before let the students through the course learning everyone three questions and the answer to the teacher mailbox, teachers unified arrangement into oral exam database, concentrated time students to participate in oral test, in the process of checking students' textbooks, classroom notes, understand its usual learning situation, each extract three questions to answer, teachers according to the students' answers, out of 10 points. Oral test can make up for the lack of the final exam, but also can dig out the students' interest points, let the students in the oral test simulation after the employment interview, is an effective exercise. Oral test, on the other hand, increase the flexibility of the exam, is beneficial to teachers understand the students' usual learning situation, grasp the teaching effect of the course, mining students' initiative, improve students' interest in learning, oral link arrangement makes the students early into the course review state, especially to usually not seriously study students bring the pressure of the heart to the overall promotion of final grades is very good.

3.2. Weekly Quiz Design

Electronic information course teaching in the United States, digital signal processing course in a semester for many classroom quiz, usually test throughout the whole learning process, and the weight is very big, up to 90%, make students in the whole process of learning the course can not relax, every other week's test prompted students to constantly consolidate and apply the knowledge learned. Therefore, only the assessment method of passing 60 points in the final examination affects the students' systematic mastery and comprehensive application of knowledge. In the teaching process, small tests are conducted, so that students can spread the pressure of the final exam in the learning process. The test passed the written test, weakening the calculation questions, emphasizing the design questions, so that students can participate in hands-on practice to get a comprehensive assessment.

In practice, the weekly open test is released through the platform of Excellent College (a universal platform designed for online teaching), so that students can participate in the form of weekly test.

Due to the introduction of the database, the test questions can be automatically corrected, so the workload of teachers is effectively reduced. The usual homework into a test, has a certain role to supervise the students' learning state. Survey feedback was conducted in practical teaching, and feedback research was conducted on students about weekly tests. A total of 273 questionnaires were collected and filled in, from engineering grade 2020 students of WIT, among which 210 were boys, accounting for 76.92% and 63 girls, accounting for 23.08%. First of all, whether students are willing to participate in the weekly test shows that most students are more willing to take the weekly test. And the weekly test design in 60 minutes is more in line with students' expectations.

3.3. Formula Concepts are Provided for the Final Examination

Digital signal processing course in a large number of concepts formula theorem content, such as the sequence of Fourier transform, discrete Fourier transform, sampling theorem, this part is suitable for formula, lead to more difficult students to remember, and in the examination students use basic concept problem solving ability assessment can provide to students, let students have less the burden of memory, to focus on using tools, to solve the problem of practice. In the application process, it is also more conducive to students to master the basic knowledge, such as fast Fourier transform algorithm, filter design and other chapters involve many engineering problems, and this part should test students' application ability, which is more suitable for open-book examination.

4. Significance and Effect of the Reform

Based on the characteristics of the digital signal processing course, the reform of four-in-one and multiple dimensions of oral test, weekly test and experimental test is proposed to provide a basic calculation formula for students in the open-book examination and improve students' learning and practice ability. In Wuhan engineering university college of mathematics and science students 'information and computing science teaching practice, tracking students one's deceased father grind and employment actual situation, there are two students admitted to the communication related professional graduate student, and in the employment interview and one's deceased father grind second test feedback reflects for course self understanding, the examination reform in the actual teaching application achieved good teaching effect.

Examination reform considering the advantages and disadvantages of open volume and closed volume, the final exam design, imitate the design of the mathematics examination of the college entrance exam, the commonly used formula, concept, reduce the pressure of students memorize formula, further emphasize the students 'ability of innovation and application, topic design is given priority to with calculation, weaken the noun explanation concept content, synchronous each university one's deceased father grind questions, the professional students are interested in the final exam results to reference to whether refer to the professional postgraduate entrance examination. Adding the oral test link, the usual test and the weakening of the formula concept in the final exam, sharing the pressure of the final exam, making students pay more attention to the ordinary learning, flexible grasp of knowledge, and have more initiative and initiative in learning. When sorting out the oral test questions and answers provided by learning, on the one hand, teachers can explore students' interests, on the other hand, they can adjust the future teaching accordingly, so that students can participate in the teaching process and achieve the teaching effect, which is a beneficial attempt.

The practice teaching and assessment system consists of four parts, namely, the target system, the content system, the management system and the guarantee system. The mutual relationship between the four parts is: the target system is the core, the content system is the foundation, the guarantee system is the condition, and the management system is the key^[10-11]. Therefore, the reform of the curriculum assessment system for digital signal processing is only a preliminary exploration, which still needs to be tested and improved in the teaching practice.

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