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Study on Design and Implementation of JAVA Programming Procedural Assessment Standard

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Abstract

The traditional JAVA course examination is just a list of questions from which we cannot know students' skills of programming. According to the eight abilities in curriculum objectives, we designed an assessment standard of JAVA programming course that is based on employment orientation and apply it to practical teaching to check the teaching efficiency of this assessment standard itself. Procedural assessment standard avoids disadvantages of traditional final examination. It puts emphasis on quality control of learning process. Through tracing and comparison of students during the last three years, procedural assessment has realized the unification of testing contents and curriculum objectives, improved students' abilities and laid the foundation of employment for the future.

Keywords: procedural assessment, JAVA programming, employment orientation

1 .Introduction

JAVA Programming is a public elementary course in universities with strong practicability and operating property. As a medical university, our school is always attaching importance to curricular situation of teaching and deepening the achievements of educational reform. When integrating the resources of excellent courses in our school, the reform of four main teaching links such as positioning of curriculum objectives, design of curriculum contents, teaching methods and methods of examination has achieved good results. The method of examination has changed from traditional written test to online examination and increased the proportion of procedural assessment. However, there are still two problems: 1) Questions in online examination are set by course teachers. It is an objective test that is inclined to assessing details in programming such as grammar and semanteme and cannot embody students' ability of programming. 2) Due to the lack of unified standard of procedural assessment, scores of the same experimental course can be different graded by different course teachers, which do not develop advantages of procedural assessment. Through continuous evaluation of students' learning process, procedural assessment becomes "an evaluation made for learning". The information that is concluded from it is used to adjust teaching. It puts emphasis on guidance and leading of learning activities and promoting forming process of ability. Li (2014) supports the cloud services Java virtual teaching environment-based the function and system architecture which stimulate the initiative of students and innovative teaching model. Research by Shi, Hu, Xi and Zhang (2010) supports the course must focus on the practice of the lesson, associate train of enterprises for credit exchange. Study on innovative Java language teaching model and reform for other programming language reveals the importance of students' ability to master (Stroustrup , 2002; Wu & Chen, 2013; Zhou, Wei, & Pei, 2014; Zhu, 2008).

Therefore, the writer designed a set of procedural assessment standard based on employment orientation, which was selected major of information management and information system in our college as study object and divided it into experimental group (in 2015) and control group (in 2013, 2014). Practice has proved that the satisfaction degree of students in experimental group is higher and their enthusiasm of participating in domestic major competitions is higher too. This laid a solid foundation of employment for the future.

2. Procedural Assessment Description

In this section, we discuss the basis for setting assessment standard and make table of procedural assessment standard which has 8 first level of capacity.

2.1 Basis for Setting Assessment Standard

The standard is set according to curricular training plan and course; it follows the reform spirit of Ministry of Education for undergraduate education, which attaches importance to the improvement of practical ability and creative spirit. When designing assessment standard, on the base of curricular core objective and refer to analytic hierarchy process, we set 8 first level of capacity, 17 second level of capacity. Each of the assessing capacity is very useful in practical work. Procedural assessment needs to be recorded. Through continuous exploring and modifying, it has become an evaluation form and been available for every student's procedural assessment. Teachers can grade students' daily learning situation through the evaluation form. As the last link of the teaching pattern that combines teaching, learning, doing and grading together, this assessment standard has realized a perfect unification of testing contents and curricular objects and achieved the goal of promoting teaching through exams, learning through grading and improving employ-ability.

2.2 Setting of Assessment Standard

According to the assessment standard mentioned above curriculum objectives require students to grasp 8 first level of capacity. The teaching contents are carried out by centering on the 8 first level of capacity. This assessment standard aims at examining the 8 first level of capacity. However, examination of skills is a complex task that needs measurable and verifiable points. Thus, we break up first level of capacity into second level of capacity and set several observing points according to each second level of capacity, which can further decompose abilities. Different abilities adopt different assessment methods and the lower the capacity, the easier it can be assessed. Assessment standard as shown in Table 1.

Examination Online is an independently developed examination system that sets questions about the knowledge students learned and gives results on site as soon as finishing. Handing in homework means students shall finish the homework assigned by teachers, and teachers will give a mark according to performance of their homework. Real-time grading refers to teachers observe students' computer practice and grade on site according to their sequence and performance. Ratings of the work means that, after learning this course, students shall finish a work (project) in groups, then teachers will give a mark according to their projects. Through this procedural assessment standard, teachers can grasp the learning situation of each student (Each student has a table prepared for them in which the ability of the student is recorded) immediately and if there is any problem, it can be solved in time. Thereby, it can urge students to grasp the ability required in curriculum objectives.

A table is designed for each student according to curricular procedural standard. Before the start of each semester course, teachers shall set electronic edition of a table for the students use. Each time when grading, teachers shall according to observation point and key point upload the results through school's on-line education. From this, students will know the process schedule of course and know their learning condition at the same time. Partial contents of table for the use of students are shown in Table 2.

Each observation point has different measurable weights according to its degree of difficulty and the score of observation point has reference. Through multiplying by the scores of each observation point in this ability and corresponding measurable focus, and then adding them together, we can get the final score of each ability, and the total score is the adding of them. When the total points exceed 100, it shall be converted into centesimal system through formula: Final score = practical score/184*100. Because some of the observation points are the key points (the items with a ※ preceded are all key points), any three of the unqualified key points indicate a disqualification of this course for this student. The setting of key points is embodies sub-ability of each level. An inadequate grasp of this ability means the first level of capacity in this part is unqualified.

In order to reflect stratified teaching, we can set a group of alternative contents for examinations, and then add extra points for students who participated in these contents during the final examination. After finishing this course, students will divide themselves into groups with each group of 5 people. Each group will accept an integrated task such as mini system that needs to be realized by interworking and cooperation. For example, design of chat room, design and realization of online shopping system and student information management and so on. The task encourages students with programming ability to take part in teachers' project team or enter corresponding programming match, from which students' learning interest and comprehensive ability will be improved.

Table 1. Abridged table of procedural assessment standard

First Level of Capacity	Second Level of Capacity	Method of Assessment	Observing Point	Full Mark	Key Point
1. Basic knowledge of JAVA	1. Java Programming Environment 2. Data Type 3. Process Control	examination online	**14**	**28**	**0**
2. Classes and Objects	4. Definition of Class and Object 5. Constructor 6. Package 7. Utility Class in Common Use	examination online + computer practice + real-time grade	**12**	**40**	**3**
3. Inherit and Multimode	8. Definition Realization of Inherit 9. Concept of Multimode 10. Relationships between Classes	computer practice + real-time grade + hand in homework	**16**	**30**	**3**
4. Interface	11. Definition of Interface 12. Realization of Interface	computer practice + hand in homework	**12**	**22**	**2**
5. Java Exception	13. Exception Handling 14. Definition of Exception	computer practice + real-time grade	**10**	**18**	**2**
6.Java Applet	15. Programming of Java Applet	computer practice + real-time grade	**6**	**10**	**1**
7. Graphical user interface	16. AWT Components 17. Event Processing of AWT	computer practice + real-time grade	**16**	**20**	**3**
8. Java Multi-threading	18. Threading in Java 18. Class of Thread and Threading 20.Thread Synchronization	**Examination online + computer practice + ratings of the work**	**12**	**16**	**2**
Total				**184**	**15**

Table 2. Table for student

JAVA Programming Procedural Assessment Standard							
College:		Major:	Name:	Student Number :			
First Level of Capacity	Second Level of Capacity	Key Points	Observing Point	Point Value	Method of Assessment	Score reference	Student's specific score
Classses and Objects	4.Definition of class and object 5.Constructor 6.Static Members 7.Practical classes in common use	38.Class definition	Learn how to define a class	1	online exam + experiment scores	5	
		39.※Instantiation of objects	Grasp Instantiation of objects method;learn to design a class of students (student number, name, class, output students' information) and instantiate students:Zhangsan, Lisi,output students' information	2		6	
		40.※Constrction method	Five characteristics of construction method Programming of argument or no-args construction method	2		4	
		41.Reference type parameter and its passing	Reference type parameter and its passing rule object as the transmission process of function parameter	2		3	
		42.※Members in living examples and in classes	Difference between instance variable and static variable Difference between instance method and static method	2		3	
		43.Overloading and multiform of methods	Condition of overloading of method Realization of mlutiform	1		3	

3. Data Collection Procedures

In the teaching process, teachers gave each student ratings according to the on-line exam and experiment scores.We selected major of information management and information system in our college as study object and divided it into experimental group (in 2015) and control group (in 2013, 2014). After finishing the course each semester, we designed a questionnaire directed at students' abilities they acquired.

This assessment standard shall be applied to students who is major in information engineering and information system. Through the method of procedural assessment, students have clear goals for each learning task, their

learning initiative and satisfaction of course is high. It shows that students' skill is higher than before by using procedural assessment standard. Figure 1 is a survey that displays students' eligibility status by comparing the last three years.

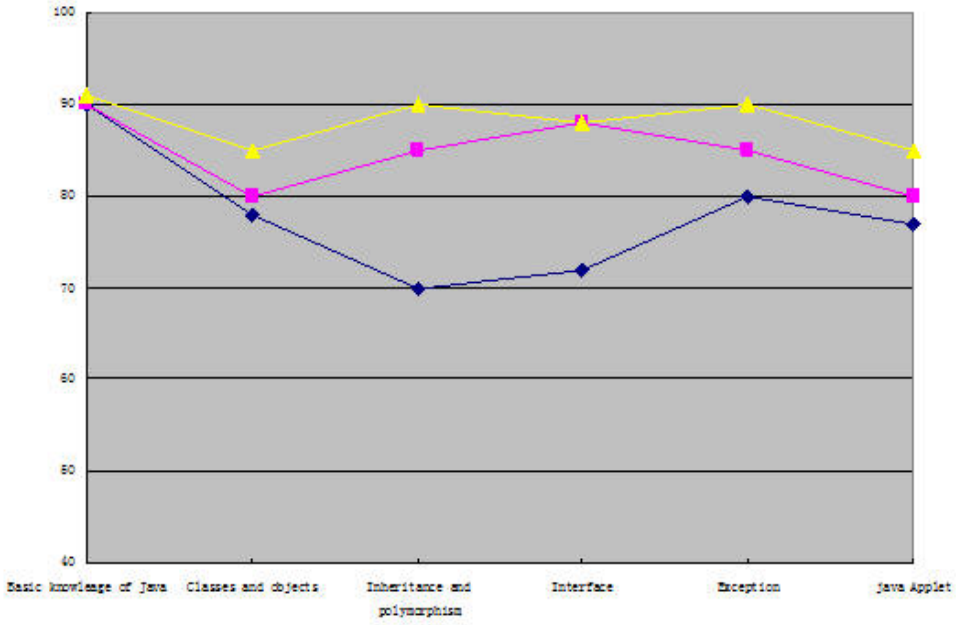

Figure 1. Contrastive analysis of students' eligibility status

4. Conclusion

The implementation of this assessment standard has achieved favorable teaching effects. Through sub-dividing curricular teaching objectives, it has corresponding evaluation mode for each knowledge point and sets each exam for each learned part, which means a conclusion of each stage of study.

Thereby, students' learning initiative, their operational capacity and programming have been greatly improved compared with before, which realized the purpose of promoting teaching through exams, learning through grading.

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