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Exploration on the Reform of Competency-Oriented Assessment Methods for Java Programming Practice

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Abstract:

This paper discusses the reform of assessment methods for Java programming practice, focusing on competency. By analyzing the shortcomings of traditional assessment methods, it elaborates on the importance of a competency-oriented approach. It details the new assessment method, including project-based assessment, phased testing, and team collaboration evaluation, and illustrates its implementation process and effects with practical teaching cases. Simultaneously, it analyzes potential problems encountered during the implementation of the new assessment method and proposes corresponding solutions, aiming to provide a useful reference for improving the quality of Java programming practice teaching.

Keywords: Competency-oriented; Assessment method; Implementation process

Java programming is a highly practical course, and practical assessment is an important means of testing students' knowledge mastery and application abilities. Traditional assessment methods for Java programming practice often focus on memorizing theoretical knowledge and writing simple code, making it difficult to comprehensively evaluate students' comprehensive qualities such as actual programming ability, problem-solving skills, and teamwork ability. With the rapid development of information technology, societal demands for the capabilities of Java development talents are increasing. Therefore, reforming the assessment methods for Java programming practice to conduct comprehensive and scientific assessments centered on competency has significant practical importance.

1. Deficiencies of Traditional Java Programming Practice Assessment Methods

1.1 Singular Assessment Content

Traditional assessments typically rely on homework and final exams. The questions are often fixed-pattern code writing or tests on theoretical knowledge points, lacking assessment of students' practical application and innovation abilities. Students might cope with exams by rote memorization of code and syntax rules without truly understanding and mastering the essence of Java programming.

1.2 One-sided Assessment Method

They generally focus only on individual code-writing ability, neglecting the assessment of teamwork and project development skills. In actual work, Java development often requires team members to collaborate on projects, but traditional assessment methods cannot cultivate or evaluate students' teamwork skills.

1.3 Unscientific Evaluation Criteria

The evaluation criteria of traditional assessments

are primarily based on code correctness and running results, paying less attention to code standardization, readability, and maintainability. This leads students to focus only on implementing functions during programming without emphasizing code quality, which is not conducive to students developing good programming habits.

2. Competency-Oriented Java Programming Practice Assessment Method

Based on the above background, the existing teaching model has obvious deficiencies in simulating real development environments, balancing learning content, respecting individual differences, and integrating theory and practice, urgently requiring a new teaching practice framework to address these shortcomings.

2.1 Project-Based Assessment

2.1.1 Project Topic Selection: Teachers design multiple project topics at different difficulty levels based on teaching content and practical application needs. Students can choose projects according to their interests and abilities. Project topics cover various aspects of Java programming, such as GUI design, database operations, and network programming.

2.1.2 Project Implementation: Students carry out project development in groups, independently completing the entire process from requirements analysis, design, coding, to testing. Teachers provide regular guidance and checks during implementation, promptly addressing problems encountered by students.

2.1.3 Project Evaluation: Project evaluation includes a presentation of project outcomes and defense. Students submit project outcomes within the stipulated time and conduct an on-site defense. Evaluation indicators include functional completeness, innovation, code quality, teamwork ability, etc. Through project-based assessment, students can apply learned knowledge to practical projects, improving their ability to solve practical problems and their teamwork skills.

2.2 Phased Testing

2.2.1 Basic Knowledge Tests: Conduct regular basic knowledge tests during the teaching process, covering content such as Java syntax, data structures, and algorithms. These tests help understand students' grasp of basic knowledge in a timely manner, providing reference for subsequent teaching.

2.2.2 Practical Skill Tests: Conduct practical skill tests after completing each important knowledge point or practical module. The test content consists of practical programming tasks related to that knowledge point, requiring students to complete code writing and debugging within a specified time. Practical skill tests help students consolidate learned knowledge and improve programming practice ability.

2.3 Team Collaboration Evaluation

2.3.1 Team Division of Labor and Collaboration: Evaluate whether the division of labor within the student team is reasonable, whether each member's strengths are fully utilized, and whether communication and collaboration among team members are smooth.

2.3.2 Team Contribution: Assess the degree of student contribution in the team project, including amount of code written, problem-solving ability, and contribution to project progress. Team collaboration evaluation cultivates students' team spirit and sense of responsibility.

2.4 Usual Performance Evaluation

2.4.1 Class Participation: Observe students' performance in class, including asking questions, answering questions, and participating in discussions. Students who actively participate in class interactions can receive corresponding bonus points.

2.4.2 Homework Completion: Carefully check students' homework, evaluating the quality of completion and timeliness of submission.

Students with good homework completion can receive higher usual grades.

3. Implementation Process and Effects of the New Assessment Method

3.1 Implementation Process

3.1.1 At the beginning of the course, The teacher provided students with a detailed explanation of the new assessment method and evaluation criteria to students, allowing them to clarify learning goals and directions for effort.

3.1.2 During the teaching process, organize students for learning and practice according to the requirements of project practice, phased testing, team collaboration evaluation, and usual performance evaluation. The teacher promptly records students' scores in various aspects and provides feedback and guidance.

3.1.3 At the end of the course, synthesize the students' scores from all links to give the final course grade.

3.2 Effects

3.2.1 Enhanced students' learning enthusiasm and initiative: The new assessment method focuses on cultivating students' practical ability and comprehensive quality. Students no longer study just for exams but actively participate in learning and practice to improve their own abilities.

3.2.2 Strengthened students' practical and innovative abilities: Through project-based assessment, students can integrate theoretical knowledge with practical application, continuously explore and innovate in practice, thereby improving their practical and innovative abilities.

3.2.3 Cultivated students' team spirit: Team collaboration evaluation encourages students to focus on teamwork during project development, learn to communicate and collaborate with others, fostering their team spirit.

3.2.4 Improved teaching quality: The new assessment method can evaluate students' learning outcomes more comprehensively and objectively. Teachers can adjust teaching content and methods based on students' actual situations, thereby improving teaching quality.

4. Potential Problems in Implementing the New Assessment Method and Solutions

4.1 Problems

4.1.1 Students struggle to adapt to the new assessment methods: Some students may be accustomed to traditional assessment methods and may exhibit resistance or difficulty adjusting to the new approaches.

4.1.2 Increased workload for teachers: The new assessment method requires teachers to invest more time and energy in project guidance, phased test evaluation, team collaboration evaluation, etc., significantly increasing their workload.

4.1.3. Difficulty in balancing the difficulty and scope of project topics: Project topics need to cover various aspects of the teaching content while also aligning with students' actual levels and interests, making it difficult to balance difficulty and scope.

4.2 Solutions

4.2.1. Strengthen guidance and training for students: At the beginning of the course, teachers should strengthen the promotion and explanation of the new assessment methods., helping students understand its purpose, significance, and methods. Simultaneously, activities such as thematic training and case analysis can help students adapt to the new assessment method as soon as possible.

4.2.2. Reasonably arrange teachers' workloads: Schools can reduce teachers' work pressure by increasing teacher numbers, optimizing teaching resource allocation, etc. At the same time, teachers can also reasonably organize their work tasks by improving work efficiency and adopting modern teaching methods.

4.2.3. Carefully design project topics: Teachers should deeply understand students' actual

situations and the requirements of the teaching content, and carefully design project topics based on practical application needs. During the topic selection process, students' opinions and suggestions can be solicited to ensure the difficulty and scope of project topics are appropriate.

5. Conclusion

The reform of the competency-oriented Java programming practice assessment method is an inevitable choice to meet society's demands for the capabilities of Java development talents. By combining various methods such as project-based assessment, phased testing, team collaboration evaluation, and usual performance evaluation, it is possible to comprehensively and scientifically evaluate students' learning outcomes and ability levels. During implementation, although some problems may be encountered, strategies such as strengthening guidance and training for students, reasonably allocate teachers' work tasks, and carefully designing project topics can effectively solve these problems, improve teaching quality, and cultivate high-quality Java development talents that meet social needs. In summary, the reform towards a competency-oriented assessment method is a process of continuous exploration and improvement, requiring joint efforts from teachers and students, constantly summarizing experiences, and making continuous improvements to promote the development of Java programming practice teaching.

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