Exploration and Practice of the Reform of Programming Courses' Assessment Methods—Taking the Course of Website Front-end Design and Development as an Example

Dongmei Yang

Yangling Vocational & Technical College, Xianyang, Shaanxi, 712100, China

Abstract: With the rapid development of information technology, programming skills become more and more important in contemporary society. In the field of website front-end design and development, its market demand also continues to rise. However, for a long time, traditional assessment methods such as paper-and-pencil exams and simple programming tasks no longer seem to be able to comprehensively assess the students' ability to apply themselves in a real working environment, which not only is out of touch with the actual needs of the industrial world, but also lacks the cultivation of students' teamwork and project management skills. Considering these problems, the article takes the course "Web Front-end Design and Development" as an example to explore and practice the assessment method of programming courses, expecting to provide a more close to the reality and more effective assessment strategy for modern programming education.

1. Introduction

In the modern information society, website front-end design and development skills have become an extremely critical ability in many industries and fields. From e-commerce to social media, from online education to media publishing, the role of front-end developers is undergoing a comprehensive shift from simple page layout design to design involving complex interactions and user experience. As businesses and organizations focus more and more on digital transformation, the demand for front-end design and development talent continues to grow, requiring developers not only to have a solid foundation in programming, but also to be able to adapt to rapidly evolving tools and technologies, and the teamwork and project management tasks that go along with them. Therefore, the question of how to develop and assess this skill more effectively, especially in the education system, has become an issue that deserves to be explored in depth. Taking the course "Web Front-end Design and Development" as an example, it is especially urgent and important to re-examine and reform the assessment methods of programming courses[1].

2. Traditional assessment methods of programming courses and their shortcomings

2.1 Traditional assessment methods

In traditional programming courses, the assessment method usually consists of two parts: paper-and-pencil examination and mini project. Paper-and-pencil exams typically focus on testing programming theory and fundamental concepts. Such an exam format may include multiple-choice questions, fill-in-the-blanks questions, short-answer questions, or case studies, and mainly covers data structures, algorithms, programming syntax, and other theoretical knowledge directly related to the course content[2]. A paper-and-pencil exam allows the instructor to get a quick sense of how well the student has mastered these areas, and thus to determine whether or not he or she has a solid grounding in the underlying theory. Mini-projects are another common assessment method, which focuses more on the practical application of programming. In this case, students are usually required to complete one or several small programming tasks, either independently or in small groups. These tasks may include building a simple website, writing an applet or implementing a particular algorithm. Through such practical projects, students have the opportunity to apply the theoretical knowledge they have learn to real-world problem solving, as well as to demonstrate their programming skills and creativity.

2.2 Shortcomings

Despite the fact that the traditional methods of assessment for programming courses-paper-and-pencil exams and mini-projects-have their own focuses, there are a series of obvious shortcomings. Firstly, it is difficult for these two methods to fully reflect students' actual programming ability. Paper-and-pencil exams test theoretical knowledge and basic concepts, whereas programming itself is a highly practical and application-oriented skill. Solving real-world problems, communicating effectively, and adapting and learning quickly in changing environments, all of which are crucial in workplace scenarios, are often overlooked in paper-and-pencil exams. Even when mini-projects attempt to fill this gap, they are usually limited to simple, isolated programming tasks that hardly simulate the complex and varied demands and challenges of real work.

Secondly, traditional assessment methods also appear inadequate in developing students' teamwork and project management experience. Programming is often a team activity that involves multifaceted collaboration and multilevel task management. In real front-end projects, in addition to code implementation, user experience, performance optimisation, data analysis and other aspects need to be considered, all of which require good teamwork and project management skills. However, under the traditional teaching model, students are more likely to participate in small projects as individuals or in small groups, and such a setup can hardly provide them with the experience of working in larger and more complex projects[3].

Finally, and most critically, there is a clear disconnect between traditional assessment methods and the actual needs of industry. Today, front-end development is a highly integrated task across multiple domains and teams. It requires developers to have not only solid programming skills, but also data analysis, design aesthetics, and even basic product and business knowledge. Paper-and-pencil exams and simple mini-projects can hardly fully simulate this complex and multi-dimensional work environment due to time and resource constraints. Therefore, although traditional assessment methods may be effective in some aspects, they still have great limitations in comprehensively cultivating and accurately assessing students' abilities.

3. Introduction to the "Web Front-end Design and Development" Course

3.1 Course Content

Website Front-end Design and Development is a comprehensive course that aims to provide students with comprehensive and in-depth knowledge and skills in front-end development. The course starts from the very basics of HTML, CSS and JavaScript to ensure that students are able to master the fundamental elements and structure of web development. HTML is responsible for the structure and content of a web page, CSS is responsible for the styles and layouts, and JavaScript is used to implement interactive and dynamic effects. These basics provide students with a solid foundation for subsequent learning. The middle part of the course moves to more advanced front-end frameworks and libraries such as React, Vue, and Angular. These front-end frameworks and libraries greatly simplify the process of developing complex applications, allowing developers to create powerful and sophisticated front-end applications more efficiently. Through in-depth study and practice of these modern front-end technologies, students will not only deepen their understanding of the underlying concepts, but also master how to use these advanced tools in real-world projects[4]. Finally, the course also covers the fundamentals of user interface and experience design to ensure that students gain a comprehensive understanding of the many facets of front-end development. This includes design principles, interaction patterns, user research, and more, all of which are necessary to create a successful and efficient front-end application. By applying a combination of programming and design knowledge, students will be able to create front-end applications that are not only powerful, but also easy to use and aesthetically pleasing.

3.2 Course Objectives

The course objectives focus on ensuring that students are able to effectively apply their front-end design and development skills in real-world projects. To achieve this, the course begins by ensuring that students have a solid foundation in programming, covering the basics of HTML, CSS and JavaScript. This lays the foundation for subsequent more advanced learning and application. By mastering these basic elements, students will be able to build simple but fully functional websites and applications. But basic skills alone are not enough. Modern front-end development involves a very large number of tools and frameworks, so the course also covers advanced front-end frameworks and libraries such as React, Vue and Angular. This not only allows students to keep up with the rapid development of the industry, but also allows them to be comfortable with the demands of more complex and varied projects.

In addition to programming skills, the course places special emphasis on the importance of user interface and experience design. A successful front-end application needs to be not only powerful but also have a good user experience. Therefore, students will learn and practice design principles, interaction patterns, and user research through real cases and projects. Through this comprehensive training, students will be equipped with all the necessary skills to build a front-end application from scratch, including but not limited to code writing, application of frameworks and libraries, and optimisation of user experience. More importantly, this teaching model is intended to give students the flexibility to apply these skills to meet the specific needs of different types of projects, thus enhancing their ability to adapt to different work environments and challenges. This not only lays a solid foundation for their future career in front-end development, but also improves their competitiveness in the whole software development field.

4. Specific Reform Attempts on the Assessment Methods of Programming Courses

4.1 Project production instead of paper-and-pencil examination

In the course "Website Front-end Design and Development", the traditional paper-and-pencil examination has been gradually replaced by actual project production. This change is due to multiple considerations. Firstly, front-end design and development is a highly practical subject. Paper-and-pencil exams focus mainly on theoretical knowledge and basic concepts, but it is often difficult to accurately assess students' performance in practical applications. In contrast, project production can provide an environment that is closer to the actual workplace, giving students the opportunity to demonstrate their problem-solving skills in real-life scenarios. Under such an assessment model, students are required to work on one or more small or medium-sized front-end development projects that often involve real-world requirements and problems. This not only motivates students to apply various front-end technologies learnt in the classroom - including but not limited to HTML, CSS, JavaScript, and related front-end frameworks and libraries - to real-world work, but also involves them in the full project cycle, including requirements analysis, design, development, testing and deployment. In addition, this project-based approach to assessment also provides scope for introducing more modern software development practices, such as continuous integration, automated testing and code review. This not only improves students' coding quality, but also helps them to better adapt to the various development scenarios and challenges they may encounter in their future work.

4.2 Encourage Teamwork

Encouraging teamwork has become a non-negligible part of teaching and assessment in the course of Web Front-end Design and Development. In the real work environment, front-end development is often a teamwork process that involves knowledge and skills in many aspects. Therefore, by promoting teamwork, students can not only improve their technical skills, but also exercise their ability to work effectively with others. Specifically, the programme typically groups students together and assigns each group one or more practical development projects. During the process, each student is required to take on different roles, such as project manager, designer or developer, in order to simulate real-life work scenarios. This not only develops students' comprehensive skills in project management, requirements analysis and problem solving, but also allows them to experience the importance and challenges of teamwork in practice. Through teamwork, students will also expose deficiencies in communication, coordination and responsibility sharing, which provides a window for teachers to understand students' soft skills so that they can give targeted guidance and feedback. For example, if it is found that there is poor communication or unclear division of labour within a group, the teacher can intervene at the right time to give specific guidance and advice[5].

4.3 Incorporate modern software development practices

Adding modern software development practices such as continuous integration and code review plays an important role in the assessment method of the course "Web Front-end Design and Development". These practices not only improve the overall quality and maintainability of the project, but also allow students to experience several important aspects of the modern software development process. Continuous Integration ensures that all code changes are automatically tested and integrated into the project, thus catching potential bugs and problems at an early stage. This encourages students to form good coding habits and also reduces project risk due to inconsistent

code quality or integration issues. Code review is another key component. Through code reviews, students are able to learn and improve from the feedback of others, as well as deepen their own understanding of front-end development best practices by reviewing the code of others. This process not only improves code quality, but also improves communication and collaboration among team members.

5. Conclusion

With the rapid development of technology and the ever-changing needs of industry, the assessment methods of programming courses need to keep up with the times. Incorporating modern software development practices such as project production, teamwork, continuous integration and code review into the assessment has shown its obvious advantages in improving the quality of education and staying close to practical needs. Such reforms not only help to assess students' programming and software development skills more comprehensively and accurately, but also better prepare them for their future careers. However, how to extend these reforms to more courses and schools more effectively, and how to further optimise and improve these assessment methods to adapt to the ever-changing technology and market needs are still issues that deserve further research and discussion.

References

[1] Yiwen Zhang, Shuo Tao. Exploration of Teaching Reform of Web Front-end Design Course Based on Enterprise Project Practice [J]. Computer Knowledge and Technology, 2022, (29):165-167.

[2] Guo Jingjing. A method for integrating programming courses with extracurricular practice [J]. Electronic Technology, 2020, (04):144-145.

[3] Zhang M, Ma WY. Research on the reform of programming class courses under blended teaching mode [J]. Wireless Interconnection Technology, 2019, (22):86-87.

[4] Huang Junlian, Zhao Dongyan, Feng Huaping. Research and practice of process assessment of computer programming language courses in colleges and universities [J]. Education Modernisation, 2019, (32):149-151.

[5] Wang Xiuhui, Ma Shufang, Su Dan. An investigation on the reform of website design and development course assessment method [J]. China Education Technology Equipment, 2019, (02):95-97.