ISSN: 2637-6067 DOI: 10.6918/IJOSSER.202411_7(11).0005

Practice and Research on Improving the Programming Ability of Students in Vocational Colleges under Real Enterprise Projects in Studios

-- Taking Zhejiang Dongfang Polytechnic as an Example.

Xiudan Huang[1, a]

[1]Zhejiang DongFang polytechnic, Wenzhou, Zhejiang, 325000, China

[a]313372754@qq.com

Abstract

This research takes Zhejiang Dongfang Polytechnic as an example and focuses on the practice of improving students' programming ability in studios under real enterprise projects. In the context of the rapid development of information technology bringing challenges to the traditional education model, the 1+X curriculum model has become a bridge connecting real enterprise projects and school education, aiming to enhance students' vocational skills and programming abilities. At present, there are problems such as the limitations of traditional PCs, inefficient utilization of computer lab resources, and inflexible experimental environments in information-based teaching. Therefore, a teaching desktop cloud platform has been designed and built in this research. This platform realizes centralized management and optimized allocation of resources, provides a personalized experimental environment, supports mobile learning and remote access, and uses server virtualization, cloud computing, and mobile Internet technologies to ensure system reliability and business continuity. This research provides technical support for the 1+X curriculum, improves students' programming abilities and the utilization efficiency of teaching resources. In the future, further exploration can be made on combining with other teaching models to achieve educational innovation.

Keywords

Real enterprise project; Zhejiang Dongfang Polytechnic; 1+X curriculum; programming ability; teaching desktop cloud platform; information-based teaching; characteristics and innovations.

1. Introduction

The rapid development of information technology is like a surging tide, continuously impacting the field of education. In this digital era, the speed of information dissemination and the frequency of updates are growing exponentially, and traditional education models are facing severe challenges. However, challenges and opportunities coexist. The 1+X curriculum model is just like a solid bridge, connecting enterprise real projects with school education.

This curriculum model has a clear goal, that is, to effectively improve students' vocational skills and programming abilities. In a highly competitive social environment, only by having solid professional skills and rich practical abilities can students better adapt to social needs and gain a firm foothold in their future careers. This research focuses on this key issue and deeply explores how to use emerging technologies to build a teaching desktop cloud platform and create an efficient programming learning environment for students. Here, students can fully utilize advanced technological resources for programming practice and exploration, and

ISSN: 2637-6067 DOI: 10.6918/IJOSSER.202411_7(11).0005

continuously improve their own programming practical abilities. At the same time, an efficient learning environment can also improve learning efficiency, allowing students to gain more knowledge and skills in a limited time. Contributing to the cultivation of high-quality information technology talents is our unremitting pursuit and mission.

2. Current Status of Informatization Teaching Reform

2.1. Deficiencies in current informatization teaching

At present, most colleges and universities still use traditional personal computers (PCs) for learning and office work when carrying out informatization teaching. Traditional PCs belong to an independent resource model. The operating system, application programs and their respective data are closely related to the hardware equipment of each PC. Each component is bound to a separate fixed hardware device. Once any link has a problem, the normal use of the system will be affected. For a long time, the installation and settings of desktop systems are complex, the installation and management of application software are cumbersome, malicious software is rampant, system loopholes emerge in endlessly, system updates and upgrades are risky, software version environment conflicts, system crashes unexpectedly, equipment is easily damaged, hardware performance is insufficient, energy consumption is high, the volume is large, and it is easy to accumulate dust, which is not conducive to carrying around. These problems have become huge challenges faced by traditional PCs. "Personal problems" such as computers getting slower and slower, being easily poisoned, files being lost or damaged, not knowing how to download or install software, not knowing how to set up the system, inconsistent multi-copy file data, files on multiple devices not being synchronized, forgetting or losing USB flash drives, etc. also give users a headache.

Although there are online learning channels such as screen recording, micro-lessons, MOOCs, and video websites in current informatization teaching, there is a lack of supporting experimental environments. Learners can only conduct theoretical learning and cannot directly participate in hands-on experiments. At present, informatization teaching is mainly carried out in school computer rooms. Most computer rooms use traditional PCs as basic units and have not fully exerted the characteristics and advantages of "informatization". They are still subject to many restrictions such as scheduling time conflicts, fixed classroom locations, insufficient equipment performance, and different configuration parameters, resulting in difficulties in building experimental environments, difficulties in carrying out projects, discontinuous progress, and inability to practice after leaving the computer room after class. Computer rooms also have problems such as high construction costs, low resource utilization, high comprehensive energy consumption, high maintenance costs, inconvenient management, and difficult asset management.

2.2. Disadvantages of traditional computers

1. High ownership cost

Traditional PCs are updated and iterated quickly. Generally, they need to be updated and replaced in about six years. Data transfer is cumbersome and the cost of new purchases is high. As the usage time increases, the maintenance cost also continues to rise. Problems such as energy consumption, cooling, and space occupation during equipment use are also very obvious. Coupled with expenses such as "high power consumption, daily maintenance expenses, accidental damage to accessories, and hardware upgrades", the total cost of ownership (TCO) is very high.

2. Complex operation and maintenance management

The traditional desktop environment binds personal user data to a specific PC device. During the use of a PC, various emergencies may be encountered. When a personal computer has a

ISSN: 2637-6067 DOI: 10.6918/IJOSSER.202411_7(11).0005

problem, the system needs to be repaired or reconfigured, and it may even need to be repaired or returned to the factory, which is both troublesome and delays learning and work.

3. Low data security

Most users store files in the local storage device of the PC without backup and encryption measures. As system security risks increase day by day, many potential problems such as equipment aging, hardware wear and tear, system failures, system loopholes, malicious theft, file damage, data loss, operational errors, and loss of storage devices (such as USB flash drives) make it difficult to guarantee data availability and confidentiality.

4. Fixed usage location

Traditional PCs are restricted by time and space environments and are not convenient to move arbitrarily and can only be used in relatively fixed positions. Although laptops can solve the mobility problem to a certain extent, there are still problems such as the need to carry equipment and the need for additional power supplies or other external devices to cooperate. When encountering cross-terminal usage scenarios, it is difficult to ensure absolute consistency of the system environment, real-time data and current processes. There are many inconveniences in actual use, affecting user experience and even business development.

5. The current dilemma faced by traditional computer rooms

The equipment (desktop computers) in traditional computer rooms has a fixed layout and is used as a public computer room for mixed use of multiple courses. At the beginning of each semester, all the software required for each course needs to be installed. If software needs to be added or modified in the middle, the entire computer room's systems need to be resent, which is time-consuming and labor-intensive. As a public computer room, desktop computers must install a "restore system". Every time the computer is restarted, the system will be restored to its initial state. Personalized modifications such as students' homework, experimental progress, and environmental configurations cannot be retained. In case of accidental power outages, all progress will be lost. At the beginning of the construction of the computer room, it is difficult to predict the number of equipment needed later, which may easily lead to insufficient quantity or idle waste; the configuration parameters of desktop computers in the computer room are slightly different, which may cause abnormalities in individual experiments; the hardware performance and configuration of computers in different computer rooms and different batches are very different, resulting in an embarrassing situation where the computer room site is idle but cannot support course teaching. Taking the computer network technology major as an example, the software and system environments required for courses such as "Cloud Platform Construction", "Network Operating System", "Network Programming Technology", "Network Management Foundation", and "Computer Network Foundation" are all implemented on the basis of "large resources". The hardware performance and configuration of ordinary computer room computers are difficult to meet the requirements of course teaching. There are also disadvantages such as inability to practice after class, inability to synchronize and retain experimental progress, resulting in the need to reconfigure the environment every time a class is held and inability to connect experimental progress. These phenomena are particularly obvious in the process of carrying out 1+X curriculum teaching.

3. Design and Construction of Teaching Desktop Cloud Platform

The design goals of the teaching desktop cloud platform are like a bright lighthouse, guiding the direction for platform construction. Realize centralized management and optimized allocation of resources, that is, uniformly store various teaching resources such as programming textbooks, case libraries, software tools, etc. on the cloud server, which is convenient for teachers to manage and update, and also enables students to obtain the required resources

ISSN: 2637-6067 DOI: 10.6918/IJOSSER.202411_7(11).0005

more quickly. Through centralized management, resources can be rationally allocated and dynamically adjusted according to different courses and students' needs, greatly improving resource utilization. At the same time, centralized management can also reduce management costs and reduce expenditure on hardware maintenance, software upgrades and other aspects in traditional decentralized management.

Provide a personalized experimental environment so that students can customize it according to their own learning progress and needs. Each student has a different learning rhythm and interest point. Some students may have a need for in-depth exploration in a certain programming field, while others need more basic practice. Through personalized customization, students can choose programming tools and environment settings suitable for themselves, stimulating students' learning interests and creativity. For example, students who like mobile development can customize the corresponding development environment, and students who like game programming can install specific game engines and development tools.

Support mobile learning and remote access, breaking the limitations of time and space and enabling students to learn anytime and anywhere. In today's fast-paced life, students' learning time and place are no longer limited to traditional classrooms and computer rooms. The platform adopts advanced technologies such as server virtualization technology, cloud computing technology, and mobile Internet technology. Like a solid cornerstone, it ensures the reliability of the system and the continuity of business. Server virtualization technology can achieve efficient utilization and flexible allocation of resources. Cloud computing technology provides the platform with powerful computing and storage capabilities. Mobile Internet technology allows students to access the platform at any time through mobile devices such as mobile phones and tablets for learning.

4. Teaching Reform and Goals

1. Fill the gap in current informatization teaching where there are only online materials and videos but no supporting experimental environment. Adopt the "integration of theory and practice" teaching mode to assist in the teaching and practice of 1+X courses, so that learners can directly participate in hands-on experiments. Teachers demonstrate while explaining theories, and students practice while learning theories. Integrating theoretical knowledge into the vivid and practical teaching process is helpful for the application and consolidation of knowledge, allowing students to gain a sense of accomplishment, stimulate learning interests, and improve teaching quality.

2. Implement strategies such as system resource sharing, quota allocation, and staggered use. While making full use of existing server resources, it can also ensure that users obtain a "large resource" and "continuous" basic experimental environment. Support the teaching and experiment of 1+X courses, and at the same time take into account courses such as "Cloud Platform Construction", "Network Operating System", "Network Programming Technology", "Network Management Foundation", and "Computer Network Foundation" to carry out informatization teaching and realize the "Internet + education" model.

3. Let learning be everywhere and let teachers and students learn everywhere. Through the deployment and application of the "teaching desktop cloud platform", "cloud desktops (Cloud Desktop)" are allocated to teachers and students to realize user autonomous management and independent use, so that learning and practice are no longer limited to a specific computer room. Teachers and students can use any networked terminal at any time and any place to easily access the "teaching desktop cloud platform" and smoothly carry out course teaching, learning practice, after-class exercises and home learning.

4. Solve the problems of high total cost of ownership, complex operation and maintenance management, low data security, and fixed usage location of traditional PCs, and break the

ISSN: 2637-6067 DOI: 10.6918/IJOSSER.202411_7(11).0005

current dilemma faced by traditional computer rooms; solve the many problems of the current public cloud server, such as cumbersome deployment of the experimental environment, inability to deploy in batches, inflexible centralized management, inability to customize experiments personally, susceptibility to the public network environment, and excessive use cost.

5. The "teaching desktop cloud platform" takes carrying and serving informatization teaching as the ultimate goal through digital teaching resource sharing and carrying out online experimental training, taking into account system reliability and business continuity, and optimizing the end-user experience.

5. Characteristics and Innovations

The "teaching desktop cloud platform" covers four major modules: cloud desktop system, file cloud management, software-defined network, and software resource service. It provides users with operating systems, file management, network access, and software services through an end-to-end solution.

1. Excellent user experience: Users can access their exclusive desktop system, manage files, access the network at high speed, and use software conveniently with zero configuration and zero maintenance at any time and place using any networked terminal, improving learning and work efficiency. The performance, functions, and capacity of the cloud desktop system can be adjusted on demand. Users can simply apply to have a personalized system. In case of problems such as file loss, it can be quickly solved by restoring at a certain time point or initializing the system.

2. Multiple terminal access: Users can easily access the desktop through local area networks, wide area networks, wireless networks, 4G, 5G, etc. by using terminals such as thin clients, traditional PCs, laptops, mobile phones, tablets, smart TVs, electronic whiteboards, and smart projectors, and process information in a timely manner and study and work efficiently. Multiple terminals can realize resource reuse and seamlessly access the same desktop to continue learning and office progress.

3. High-quality network performance: Adopt centralized network management to provide high-quality network access services with 10-gigabit-level core and 1000-megabit-level export. The intelligent DNS policy routing is intelligent route selection for multiple operators and multiple lines. The high-speed cache service realizes intelligent caching, content acceleration, and local proximal supply of hot resources. The network security strategy meets the network requirements of different scenarios of 1+X courses.

4. Rich software services: The cloud desktop system provides an experience of rapid software installation or even no installation, avoiding problems such as software being tampered with. The application store provides the original installation source; green software is a packaged single-file program that can be used after downloading; online applications obtain services through icon links; WebApp realizes cross-terminal and cross-platform access to online application software through a browser.

5. Stable, safe and reliable: The platform adopts a cluster, load balancing and distributed system architecture to ensure stability and reliability. Provide centralized immunity for the user system to avoid malicious software attacks without the need for additional security software. There is hardware-level, system-level, and network-level isolation between different users. The underlying data is encrypted and stored. The dedicated business network is isolated. External application guarantees are provided to ensure platform stability and user data security.

6. Green, low-carbon and environmentally friendly: Compared with traditional PCs, the "teaching desktop cloud platform" has lower manufacturing costs, energy consumption and environmental pollution. The overall centralized hosting and centralized system operation and

ISSN: 2637-6067 DOI: 10.6918/IJOSSER.202411_7(11).0005

maintenance can effectively integrate resources, improve utilization, reduce idle waste and costs, and reduce power consumption.

6. Conclusion

The teaching desktop cloud platform built in this research provides strong technical support for 1+X courses and has great practical significance. The implementation of the platform not only improves students' programming abilities but also optimizes the utilization efficiency of teaching resources. Through centralized management of teaching resources, teachers can update and adjust teaching content more conveniently, and students can obtain the required resources more quickly and achieve personalized learning.

In the future, we can further explore how to combine this platform with other teaching models to achieve more extensive educational innovation. For example, combine with project-based teaching to let students apply programming skills in actual projects and improve their problem-solving abilities; combine with the flipped classroom model to enable students to learn independently through the cloud platform after class and conduct in-depth discussions and practices in class. At the same time, continuously optimize the performance and functions of the platform to provide a more solid foundation for cultivating high-quality information technology talents with innovative spirit and practical ability.

7. Fund Project

Project of Zhejiang Dongfang Polytechnic: Practice and Research on Improving Students' Programming Ability in Xia Studio of Real Enterprise Projects, Project Number: DF2024JGYB75.

References

[1] Yang Fang. Exploration on Ideological and Political Teaching of Programmable Controller Application Technology Course: Taking Huanggang Polytechnic College as an Example[J]. Journal of Huanggang Polytechnic College, 2024, 26(02): 35-37.

[2] Zhong Jian. Discussion on Ideological and Political Teaching of 1+X Multi-axis NC Programming and Machining Course[J]. Agricultural Engineering and Equipment, 2022, 49(02): 59-62.

[3] Li Zejun. Discussion on the Construction of Industrial Robot Application Programming Vocational Certificate Training System Based on the Pilot of "1+X" Certificate System[J]. Agricultural Machinery Usage & Maintenance, 2021, (09): 121-122.

[4] Liu Dalong, Ding Duo. Practical Research on Project-based Teaching in the Course of "Industrial Robot Operation and Programming"[J]. Computer Knowledge and Technology, 2021, 17(05): 144-145+169.

[5] Shao Liqun, Ni Bijun. Exploration and Practice of School-enterprise Collaborative Cultivation of Innovative and Entrepreneurial Talents Relying on Enterprise Colleges: Taking Gaochuang Telecommunication College of Suzhou Institute of Industrial Technology as an Example[J]. Journal of Tongling Vocational & Technical College, 2020, 19(03): 4-6+10.