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Design of online and offline digital teaching platform for art design major based on MOOC

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ABSTRACT
In view of the problems existing in the traditional online and offline digital teaching platforms of art design major, such as difficulties in learning situation analysis and ineffective learning results, this project plans to build an online and offline digital teaching platform for massive open online course (MOOC). In hardware, the design of Winbond storage unit and CPU is completed. In the software part, combining with data cleaning technology and based on the experience subject principle of MOOC, the automatic interactive grouping of online and offline is developed, and the grouping results are combined with functional modules to finally realize the design of the teaching platform. Through the experiment of the designed experimental platform, the experimental results show that the designed experimental platform can effectively promote the learning of the experimental class, and can effectively improve the learning performance of the experimental class.

KEYWORDS
Massive Open Online course (MOOC); Art design; Online; Below the line; Digitization; Teaching platform

1 Introduction

Blended teaching refers to the combination of online and offline teaching based on learning content to achieve teaching objectives [1-2]. Research shows that the implementation of online and offline digital mixed teaching can not only increase the attractiveness of teaching content, but also guide students to carry out deep learning, thus improving the teaching effect [3]. At present, most universities will adopt mixed teaching platforms of online and offline teaching to carry out mixed teaching [4]. On this basis, Yin Jianjun and other scholars proposed an embedded remote mixed teaching platform based on Web technology. Through Web technology, logical units are established and central database is generated to realize online and offline digital teaching. Zhang Ling proposed an online and offline teaching platform based on intelligent technology, which can automatically generate different teaching modules according to different teaching requirements, so as to achieve a personalized combination of online and offline[5-7].

2 Hardware Design

2.1 Winbond storage

In the operation process of online and offline digital teaching platforms, a variety of instructions will be involved, including task instructions issued by teachers, homework instructions and assessment instructions, and various feedback instructions replied by students [8]. On this basis, select the W25X40CLSNIG winbond memory model, as a platform at the core of the packet, use the SOIC - 8 _150mil encapsulation, storage capacity of 256 MB, serial peripheral interface (SerialPeripheralInterface, SPI interface, The clock frequency is 104 MHz, the supply voltage is 2.3~3.6 V, and the delay time is 2 ms.

2.2 CPU

The CPU of the system mainly includes three modules: operation logic module, signal transmission module and control module. The CPU processes the data from the data bus, uses arithmetic logic unit for code conversion, calculates the operation loss of each instruction, obtains the best code instruction, and transmits it to the control unit.

3 Software Design

3.1 Design online and offline automatic interactive grouping based on MOOC

In order to efficiently conduct class summary and complete dynamic chemical situation analysis, MOOCs are combined with data cleansing technology to realize automatic interactive grouping. The relevant package data is cleaned up so that the initial value of each group is zero. The group exponential cosine similarity cos theta for each group is calculated in this

way:

$$\cos\theta = \frac{x\,y}{\sqrt{x^2+y^2}}$$

Where: x is the initial ability value of students; y is the ability value of the students after cleaning. At this point, we can assume the total number of students in the class, conduct comprehensive ability assessment, and calculate the standard ability value W of each group. The formula for calculating the standard ability value W of each group is

$$W = \frac{\sqrt{xy}}{N} + x^2 + y^2$$

Where: N is the number of interactive groups. Select the group leader according to the above comprehensive ability values, and calculate the comprehensive quality index Q of the group leader. The formula for calculating the group leader's comprehensive quality index Q is

$$Q = 1 - \sum_{i=1}^{m} x_i y_i$$

In the formula, xi and yi are the comprehensive quality values of randomly selected personnel. The above calculation can effectively carry out online and offline automatic interactive grouping and improve the efficiency of system operation.

$$\lim_{n\to\infty}\left(1+\frac{1}{n}\right)^n$$

3.2 Divide functional modules of online and offline digital teaching

The main function modules of this system include: user management, course management and so on. User management module divides user roles according to user permissions [10]. In this chapter, we will cover the basic process of the course in detail.

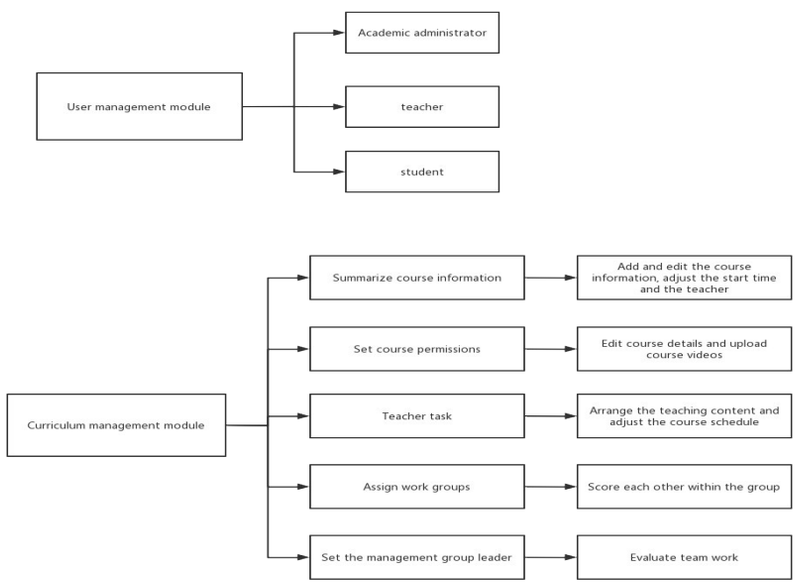

Fig. 1 Course management module flow

4 Platform application test

In order to test the teaching effect of the MOOC-based online and offline digital teaching platform for art design major, this platform is compared with the embedded remote mixed teaching platform based on Web technology proposed in literature [1] and the artificial intelligence online and offline mixed teaching platform proposed in literature [2].

4.1 Application Test

This study intends to take 30 students from Class M of art design major of a university as the research objects to conduct an empirical study. Thirty students from Class M are divided into Group a, Group b and Group c according to their student numbers 1~10, 11~20 and 21~30. From March to mid-July in the second semester of 2022, the platform will be used to teach three courses: Design History Theory, plane composition and design, and Color composition and design. Among them, group a adopts MOOc-based online and offline digital teaching platform for art design major proposed in this paper, group b adopts embedded remote mixed teaching platform based on Web technology proposed in literature [1], and group c adopts artificial intelligence online and offline mixed teaching platform proposed in literature [2]. Finally, the total scores of the three subjects in the three groups were counted, and on this basis, the total scores of the three subjects in the three groups were compared. The results of the last test of the three subjects in Class M last semester are shown in Table 1 below.

Table 1 Examination results of three subjects of Class M students at the end of last semester

Studentnumber	Historyofdesign	Planecompositionanddesign	Colorcompositionanddesign
1	85	93	92
2	85	86	84
3	80	82	80
4	70	76	78
5	75	82	80
6	77	76	80
7	75	80	84

This paper chooses CLIENT as the experimental platform. Before the experiment starts, the platform operation performance needs to be tested. After the operation performance test is passed, the experimental comparison can be carried out. The higher the positive difference of student achievement after using the platform, the better the teaching effect of relevant platform. The formula for calculating the positive difference J of test score is

$$J = S - S_0$$

Where: S is the final examination score of students after using the relevant platform; S0
Is the final examination scores of students in the previous semester before using the relevant platform to teach.

4.2 Application Test

Results and Discussion After one semester of teaching, the final examination results of three subjects of the second semester of 2022 for students in Class M are obtained, as shown in Table 2.

Table 2 Examination results of three subjects of Class M students at the end of the next semester

Studentnumber	Historyofdesign	Planecompositionanddesign	Colorcompositionanddesign
1	93	100	100
2	96	96	95
3	92	100	95
4	84	90	93
5	85	93	94
6	87	87	92
7	86	92	94

According to Formula (4), the positive difference between Table 1 and Table 2 is calculated, and the results are shown in Table 3.

Table 3 The difference of test scores of M students in three subjects after teaching on different platforms

Studentnumber	Historyofdesign	Planecompositionanddesign	Colorcompositionanddesign
1	8	7	8
2	11	10	11
3	12	18	15
4	14	14	16
5	10	11	14
6	10	11	12
7	11	12	10

As can be seen from Table 3, the students in Group b who use the embedded remote mixed teaching platform based on Web technology proposed in literature [1] for learning have improved their scores of 3 subjects by 2-4 points. If the artificial intelligence mixed online and offline teaching platform proposed in literature [2] is applied to the students of Group c, the scores of these three subjects can be improved by 5~8 points. By using the MOOC-based online and offline digital teaching platform for art design major designed to study students in Group a, the scores of three courses can be improved by 7 to 18 points. In the major of art design, the application of online and offline digital teaching platforms based on MOOCs has significantly improved students' academic performance. Therefore, the MOOC-based online and offline digital teaching platform for art design majors designed in this paper has good teaching effects, can effectively improve students' academic level, and has certain promotion value.

5 Conclusion

Based on the above research, and in response to the practical teaching needs of art design majors, this study proposes a hybrid online and offline digital teaching platform grounded in the MOOC model. The platform is designed to leverage the flexibility, accessibility, and resource richness of MOOC, while integrating them with offline studio-based teaching methods to better align with the experiential and project-driven nature of art and design education.

Through practical application and iterative refinement in real teaching scenarios, the platform has demonstrated strong effectiveness in enhancing student engagement, supporting personalized learning, and improving overall learning outcomes. It facilitates dynamic interactions between teachers and students, supports diversified teaching content, and encourages independent exploration and creative expression. The implementation of this platform not only validates the feasibility and advantages of MOOC-based hybrid teaching in art design education, but also offers valuable insights and a practical reference for the digital transformation of related disciplines. This research represents a meaningful exploration into the future development of art and design pedagogy in the digital era.

About the Author

Jiangyue Han, PhD student in Integrated Art and Design at Silla University in Republic of Korea, associate professor, research interests: brand planning, cultural and creative product design, and teacher innovation team building.

References

[1] Yin Jianjun, Yin Ling. Design of embedded Computer Remote Assisted Teaching System based on Web Technology [J]. Modern Electronics Technique,2021,44(16):25-29.

[2] Zhang Ling. Design of Distance Teaching System Based on Artificial Intelligence Network [J]. Modern Electronics Technology, 2021, 44(2): 131-134.

[3] Chen Jufang, Zhu Fuxian, Hu Kejun. Research and Practice of Mixed Teaching Model for Mechanical Majors Based on SPOC: A case study of "Theoretical Mechanics" course [J]. South China Agricultural Machinery,202,53(18):183-187.

[4] Wang Xin, Chen Shuguang, Xiao Yanping. Exploration and practice of Mixed Online and Offline Teaching Model: A progressive problem-driven large class physics classroom in University [J]. University Physics,202,41(9):37-42.

[5] Li Guoping, Wang Xiaoqing, Chai Chunpeng, et al. Teaching Exploration of Online and Offline Hybrid teaching Mode based on MOOC in Polymer Physics: A case study of "Molecular motion of polymers" [J]. Polymer Bulletin,2022(10):162-168.

[6] Li Ruixia, Fu Maosheng, Zhang Jinhong, et al. Exploration and Practice of Student-centered Mixed Teaching Model: A Case Study of Computer Network [J]. Science and Technology Information,202,20(17):155-160.

[7] Li Huaimin, Chen Xiuming. Research and Application of CDIo-based Hybrid Teaching in the Background of New engineering: A case study of Database Principle and Application course [J]. Journal of Anshun University,202,24(4):129-134.

[8] Han Jianqiang, Liu Bo, Guo Xueyuan, et al. Practice and Analysis of Online and Offline Mixed Teaching Model in Civil Engineering Curriculum [J]. Journal of North China University of Science and Technology (Social Sciences Edition),202,22(4):95-99.

[9] SONG Fengquan, Tang Qiong, Sun Xiaoxia. Research and Practice on the Reform of Mixed Teaching Mode of "College Physics" Course: A Case study of Hefei University of Technology [J]. Heilongjiang Education (Higher Education Research and Evaluation),2022(7):35-37.

[10] Xu Rui. Design of Teaching Resource Sharing Platform based on Cloud Computing [J]. Information and Computer (Theoretical Edition),2022, 34(9):101-103.