



Design of a Flipped Classroom Platform for Online Music Education in Colleges and Universities Based on the Internet

Hui Lin¹(✉) and Yang-bo Wu²

¹ Xinyu University, Xinyu 338000, China

² College of Mathematics and Computer, Xinyu University, Xinyu 338000, China

Abstract. Online music education is one of the important contents of college education. However, the traditional education mode is too old to cultivate students' innovative consciousness and music practice ability. With the development of Internet technology, great changes have taken place in various fields, and the curriculum system and the mode of music education in colleges and universities have also been affected. Based on the background of "Internet", this paper constructs the classroom platform of online music education in colleges and universities, and puts forward clear provisions on education contents, teaching methods and teacher training. The research proves that the designed platform can effectively improve the quality of classroom teaching, provide high ability compound talents for the society, and has a very good application prospect.

Keywords: Internet background · College music · Music education · Education platform

1 Introduction

The forms of video and broadcasting in online teaching are carried out in real time, which can effectively improve the learning efficiency of learners. Therefore, online video has become an indispensable learning method in the field of Internet education [1, 2].

The 21st century is the network information age, the Internet gradually infiltrates into each profession, and is playing the key role, is playing the important role in the education profession [3]. This paper designs the overturning classroom platform of online music education in colleges and universities under the background of Internet. The external and internal resources of the Internet constitute the basic resource module. Different sub-layer modules constitute the logical layer of the platform. The service application layer, security layer and data layer constitute the resource operation service module. The construction process of the system is completed. This process clarifies the concept of overturning classroom, analyzes the path of education development, and proves that the overturning classroom platform can effectively cultivate music talents, improve teaching quality, and meet the rapid development of economic level and social needs [4].

Based on the above research background, this paper designs a new college music online education reversal classroom platform from the structure and operation of the Internet platform, and validates its effectiveness.

2 Internet-Based Classroom Platform Mode for Online Music Education in Colleges and Universities

Although online music education in colleges and universities can take the most traditional way of classroom teaching, but the effect is not good [5]. Traditional teaching methods pay more attention to theoretical explanation, lack of practical teaching, students understand it very difficult [6]. The Internet can be built on the network to help students learn at any time, anywhere [7], while the network can expand a lot of resources together, the introduction of state-of-the-art music education courses, students can intuitively learn music master lectures [8]. Internet teaching is also more diversified in learning methods, whether online tutoring or offline practice, can improve the learning effect of students, pay more attention to the ability to test in the assessment, not limited to theoretical knowledge.

The Internet has a profound impact on music curriculum, changing the structure of the classroom and curriculum content, the current music education curriculum can not leave the Internet. Music courses can be divided into modules according to the students' musical skills, including: music initiation course, music case course, music practice course and music competition. The teaching structure adopts online and offline simultaneous teaching, which is not equivalent to the traditional professional courses, public courses, elective courses and expansion courses. The teaching mode under the Internet completely trains the students' abilities, exercises the students' thinking mode and enables them to have better music skills [9].

Traditional music online education flip platform is composed of self-built infrastructure. Because its server occupies a large amount of memory, flip classroom platform will happen when the number of users exceeds the limit, Karton and automatically exit the platform [10]. Some illegal personnel will make use of platform loopholes to steal classroom resources on the platform, there is no guarantee to reverse the intellectual property rights of classroom resources. In order to solve this problem, a new online music education turnover platform is designed based on the Internet. The platform is composed of resource infrastructure module, resource operation service module and resource access output module. The Internet-based College Music Online Education Reversal Classroom Platform Module is shown in Fig. 1 below:

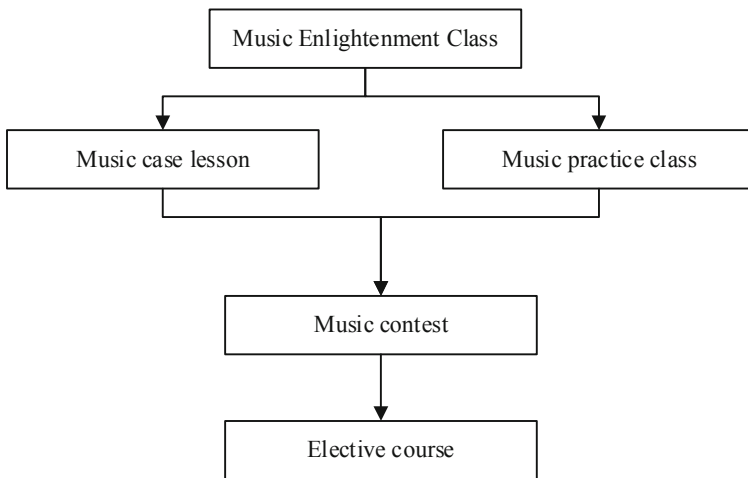


Fig. 1. Internet-based classroom platform for online music education in colleges and universities

The core of the resource infrastructure module is the processing method of cloud computing resources. It can logically classify all the data entered on the music online education reverse platform. There is a logic layer and a presentation layer in the resource infrastructure module. The resource base module is used to identify data, and the specific process is shown in Eq. (1).

$$G = \frac{\sum_{i=1}^n f_i u}{A} - \lambda \quad (1)$$

In formula (1), A represents the total amount of data to be processed. u stands for data transmission speed. The size of the n data in the data is f_i . The advantage of the cloud computing resource processing model is that it can identify and analyze data, quickly determine the type of data, use the least time and space to analyze the corresponding data and finally classify the data for storage [11].

The logical layer of the resource infrastructure module is composed of many different sub-layer modules. These sub-layer modules are the places where different types of materials in the music online education flip platform are stored. Each sub-layer module has a unique function to facilitate learners to use the Internet. Easy to call. After a lot of data investigation, all knowledge resources are related and there is no hierarchical relationship, so all sub-layers are in a cooperative relationship to form a complete resource infrastructure block. The task of the presentation layer is to extract and express resources by receiving remote call signals from learners.

The resource operation service module is the main module for regulating and controlling the online music education reversal platform, and its main task is to prevent external lawbreakers from stealing knowledge resources by real-time monitoring the operation of the knowledge reversal classroom platform. The specific control process is

shown in formula (2).

$$F = \frac{\sum_{i=1} f_i \vartheta}{G} - \vartheta \quad (2)$$

In formula (2), ϑ is the data transmission error. ϑ is abnormal data in the operation of the platform. At the same time, it is also responsible for monitoring the scheduling instructions given by the Internet users and handling the opinions of some learners on the knowledge reversal classroom platform. The resource operation service module is mainly composed of service application layer, security layer and data layer. The security layer is to ensure that learners' knowledge reversal classroom platform is in a safe environment.

Security layer provides a secure information interaction environment for browsers and knowledge reversal classroom platform. Music online education reversal platform detects the security of Internet browsers through application layer and the security of data resources inside the reversal classroom platform through application layer. The service application layer mainly provides the ordering and inquiry service for some paid resources in the process of Internet to learners [12]. At the same time, when the music online education platform updates new functions, the service application layer will investigate and give reasonable feedback according to the learning tendency of different learners [13]. Compared with the data layer of the traditional inversion classroom platform, the data layer of the online music education inversion platform based on the Internet has a prominent improvement. The data layer of the resource application service block also verifies the collected learning resource data, prevents some unscientific information from entering the formal overturning classroom platform, disturbs the learning cognition of the Internet users, and increases the reliability of the Internet-based overturning platform for online music education.

The resource access module is to collect learning resources from different aspects through multiple ways, and then access the resources legally based on the Internet-based online music education reversal platform within the reversal classroom platform, expand the field of knowledge reversal classroom platform and absorb the external resources of the resource infrastructure block [14]. Compared with the traditional Flip Platform of Music Online Education, the Flip Platform of Music Online Education in this paper sets up an additional resource terminal, which ensures the real-time and high efficiency of the Flip Platform resources. If the application layer collects better learning resources, the original resources will be destroyed through the resource terminal when the resources enter the Flip Platform.

3 Construction of Internet-Based Classroom Platform for Online Music Education in Colleges and Universities

Many people think that the music platform is to "train musicians" and "solve the employment problem", which is a wrong understanding of the music platform, and this way of understanding will cause the education platform to become a platform for individual students. At present, there are many problems in college education [15]. Although the

teachers can understand the teaching goal before teaching, they only pay attention to “passing on knowledge” and “passing on skills”, but ignore whether the students can achieve the teaching goal and really master the knowledge passed on by the teachers [16]. Today, with the rapid development of science and technology, the market competition is becoming more and more fierce. Education should not remain in the teaching of book knowledge, but should take into account students’ personal feelings, interests and hobbies. Besides “teaching and solving puzzles”, it is also necessary to help students establish a correct outlook on life and values, grasp students’ ideological trends and emotional changes, and improve students’ comprehensive quality.

In the teaching method, the innovation music education platform must be more diverse. Teachers should make full use of available tools to convey information to students. Teaching should not stay on textbooks, chalk or blackboards. The Internet era provides a lot of resources for students, but also provides more convenient teaching means for teachers [17]. Electronic teaching plans, multimedia courseware, network courses, distance learning, video and other means should all become the mainstream teaching means of the Internet era. Through these new means to attract students’ attention, thus achieving the goal of effective communication of information. Only in this way can students and the whole teaching system make common progress. Teachers can help students understand music opportunities through the music process of typical social enterprises, and clarify how to manage, laying the foundation for future music practice. Many famous colleges abroad will apply the teaching method of combining practice with theory [8]. Baisan Business School of famous business school has abandoned the traditional teaching method when developing the students’ musical practice ability. They let the students understand the music spirit through on-the-spot teaching, and use the visit to music companies to cultivate the students’ musical enthusiasm. The above teaching method of combining interest with knowledge can effectively stimulate the students’ enthusiasm for learning.

Teachers are one of the factors that can not be ignored in constructing innovative music education platform in colleges and universities. Innovative music courses are a combination of theory and practice. Teachers with rich professional knowledge and strong teaching ability are required to teach them [18]. In addition to a solid foundation of knowledge, the teachers of the College must always contact with enterprises and elites in investment, music, management, etc., to master the latest music information, and to promote students’ progress through the support of enterprises. Schools shall integrate excellent teachers, set up innovative music teaching and research offices, set up a number of teachers with high level and strong ability, carry out special training on a regular basis, vigorously cultivate young backbone teachers [19], provide opportunities for teachers to exchange and visit schools, and encourage teachers to visit excellent music enterprises and learn about music practice experience. The establishment of an assessment system, the inclusion of innovative achievements in music education in the indicators for the assessment of teachers’ professional skills, the implementation of a reward and punishment mechanism, and the commendation and encouragement of teachers with excellent performance and outstanding ability may enhance the enthusiasm of teachers and encourage more teachers to make continuous progress by improving their treatment and paying bonuses [20]. Besides the teachers, the school can also invite

investors, celebrities, musicians, experts and scholars from all walks of life to come to the school to give lectures regularly and use their own experience to teach and explain to the students. Innovative Music Education Architecture as shown in Fig. 2:

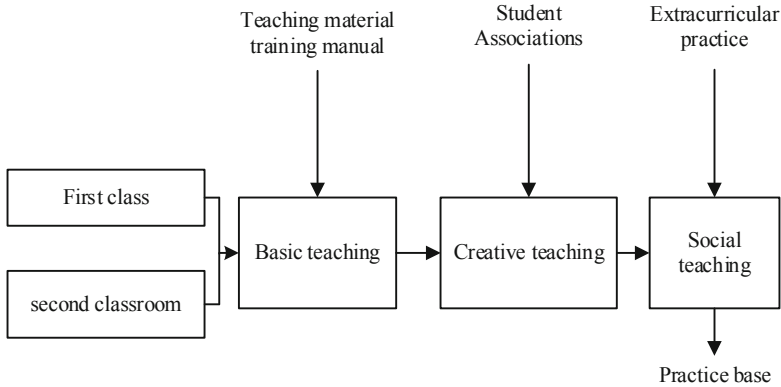


Fig. 2. Innovative music education architecture

With the deepening of the curriculum reform, many colleges and universities have included innovative music education into the scope of education and teaching reform, and have made some efforts. Although great progress has been made through various efforts, there are still many problems, such as: the reform of innovative music education form is still too single, lack of overall control, and lack of systematic. Therefore, it is necessary to have a complete classroom system, linking the contents of each class, forming a perfect curriculum system, so as to gradually enhance the students' musical practice ability. In the music course, The musical thinking of college students should be cultivated. Through other courses, students can have a superficial understanding of the framework of music knowledge. Students have a keen understanding of music and establish a basic understanding of music. Colleges and universities can encourage students to participate in a series of elective courses such as music fundamentals and music programs through credits to learn more about music [21]. When setting up elective courses, the professional platform may be set up according to the characteristics of the colleges and universities, and compulsory requirements shall be adopted for students to take at least one elective course, so as to encourage students to expand the scope of knowledge and actively participate in various extracurricular practices while learning the basic knowledge. Schools can organize mass organizations, create a musical atmosphere, strengthen the construction of campus culture, improve students' comprehensive level and enhance students' social adaptability.

Teaching links can not be a single simple. The principle from simple to in-depth should be followed. The interconnection between the various links is guaranteed. On the premise of ensuring that students can have enough learning space, teach students knowledge to the greatest extent. The music education may carry on the pointed teaching according to student's individual characteristic, the development consults the service, helps the university student to answer questions [22]. In addition, schools can actively

carry out various lectures, face-to-face teaching, students can interact with the lecturer, through this way to solve the problems faced by students, while enhancing students' interest in learning. The teaching system should be perfected and innovated from four aspects: basic teaching, creative teaching, social teaching and cooperative teaching (Fig. 3).

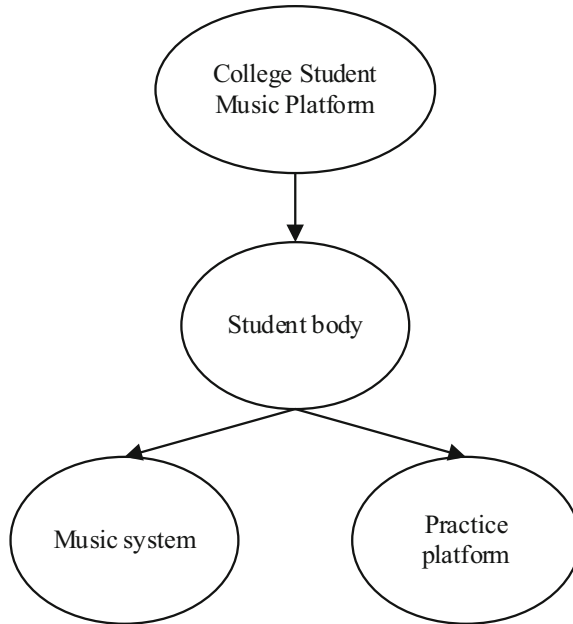


Fig. 3. Innovative music education practice platform

The establishment of innovative music education practice platform is of great significance to the development of students' innovative ability. The degree of grasping theory depends on practice, and practice is the only means to test the truth.

4 Workflow Design of Music Online Education Turnover Platform Based on Internet

Because the traditional knowledge reversal classroom platform adopts the method of recording and broadcasting, the internal learning data of the platform may change with the change of time, which will lead to some misunderstandings to the learners. The complete process task execution process diagram is shown below (Fig. 4):

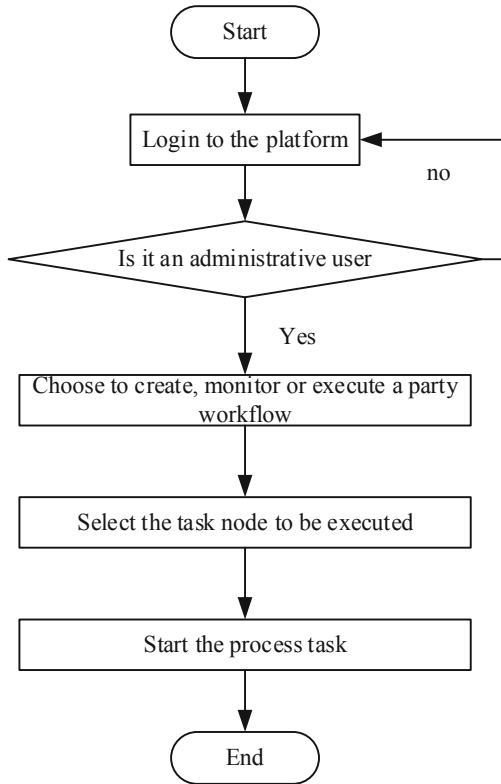


Fig. 4. Flowchart of online education flip platform based on Internet music

Although the process task management step is to carry out some simple commands of the learning user, such as searching for courses, the core function of the knowledge reversal classroom platform is still to communicate with other users or lecturers. In order to improve the problem that the Internet can not monitor the state of users in real time, the task management of the Knowledge Reversal Classroom Platform in this paper will input the task points of this study in advance before the users study, and these task points will regularly remind the learners to complete the learning task, and facilitate users to review and summarize the task through the recording function. Enhance the sensitivity of the platform to keywords, once there are keywords, you can quickly lock the direction of resources, reduce the learning knowledge to reverse the running time of the classroom platform. If the Internet-based knowledge reversal platform fails, the task management inside the platform must determine the cause of the failure according to the type of the failure, and quickly resume the normal operation of the reversal platform. The task management process of the online music education turnover platform based on the Internet has its own special working components. Special working groups can assist in-house staff in the maintenance of the Music Online Education Rollover Platform. But through the task management process designed in this paper, these three aspects can cooperate with each other to create a stable operation of the source of learning

music online education turnover platform. The internal levels of task management are as follows (Fig. 5):

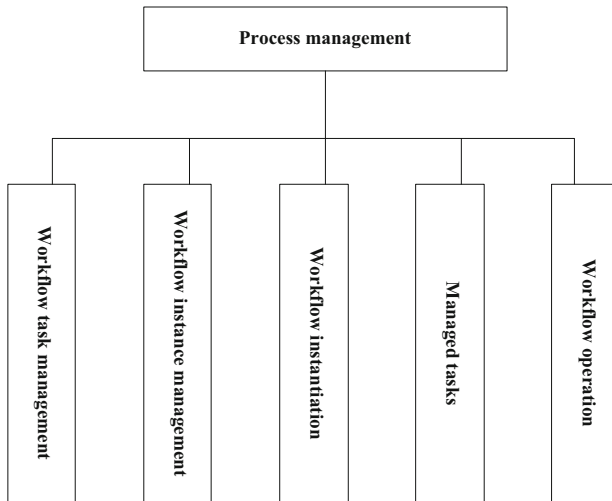


Fig. 5. Internal hierarchy of task management

Because of the rapid development of the Internet, data is easy to be lost and stolen in the process of transmission, and related to knowledge resources, can not be simplified, so the knowledge turnover platform designed in this paper adds the steps of rights management in the work, so as to better protect user privacy. Users on the Internet-based Music Online Education Flip Platform can set their own browsing records visible, can also set everyone visible, can also delete any one of the browsing records. Only the same identity will appear on the user's experience side. The resources with identity on the Internet based music online education reversal platform are as if they are locked, unless the system is automatically removed, or the attributes can not be changed. After the above operation, if the Flip Classroom Platform receives the user's command, the Internet-based Music Online Education Flip Platform creates a process instance that matches the command.

Process Instance Management is a step to manage the user's upcoming operation. While transmitting the user's instructions, the Music Online Education Reversal Platform of the Internet will also provide the user with the resources he wants, and the platform will automatically detect the instance command. If there is any risk degree, the user's learning on this platform will be terminated immediately. Jbpm4, Oworkflow and Shark are all similar, but Jbpm4 occupies a lot of memory space and consumes a lot of resources and time when running. Oworkflow does not support transaction management mechanism, which makes the platform of this structure selective for learning resources and unsatisfactory for learners.

The advantage of the method is that it adapts to the online music education reversal platform of the Internet as high as 95%. In addition, it also has good continuity and connects with the resources of the outside world. If a new word appears in the

resource field, the Actiti5 command detection method will actively input the resources. The Actiti5 command detection method increases the visualization ability of the music online education reversal platform based on propagandist learning, and alleviates the sudden system crash when the knowledge reversal classroom platform is overloaded. This is not only a simplification of the flip platform itself, but also a reduction of the work of internal developers. The flip platform for online music education will find out the internal glitches by itself, avoiding labor-consuming detection. The functional comparison tables of the specific types of detection methods are as follows (Table 1):

Table 1. Comparison of four user command detection methods

Name	Jbpm4	Activiti5	Osworkflow	Shark
Database persistence	Hibernate	Failure to comply with jpa norms	Built-in plug-ins	Dods
Process definition language	Bpel, Xpdl	Bpma2 Jpdl	Xml format	Compliance with xpdl norms
Support database	Support most databases	Support most databases	Support most databases	Support most databases
Process definition tools	Eclipse graphical plug-ins and web designers	Eclipse graphical plug-ins and web process designers	Manual writingxml	Jawe tools
Open source	Open source	Open source	Open source	Open source
Application deployment	Embedded or standalone deployment	Embedded or standalone deployment	With application collections	Flushbonading
Enlarge	Flexible expansion	Flexible expansion	Super stretch	Easier to extend
Monitoring content	Process definition/instance creation	Various log information of task schedule and execution status process, statistical analysis of process data	Part of the process information, complex processes need to customize the regulatory approach	Process definition, instance creation
Management mechanisms	Jat-based things management mechanism	Mybatis things management mechanism	Non-support for business management mechanisms	Adopt jutm things management mechanism

Responsibility management process is one of the important processes in the work of Internet-based music online education overturning platform. The task of Responsibility management process is to control the structure modules of Internet-based knowledge overturning platform. When receiving the command from a user, it can find the task of each structure block reasonably and quickly. The clear responsibility relationship between the structure blocks is very important. If the right and responsibility relationship is not clear, the resource output speed of the user in the Internet-based music online education overturning platform will be slow, and the learning efficiency will decrease. So the path of the work flow inside the knowledge reversal classroom platform is clear, which can improve the efficiency of users' tasks and save the memory inside the knowledge reversal classroom platform.

5 Experimental Research

5.1 Experimental Purposes

In order to verify the operation effect of the Internet-based online music education reversal platform designed in this paper, the experiment is compared with the traditional knowledge reversal classroom platform. In order to ensure the authenticity and scientificity of the experiment, the final evaluation result of this paper integrates the results of the user's experience and the use rate of the two platforms in a certain time.

5.2 Experimental Procedure

The experimental operation and the analysis of the experimental results are as follows:

- (1) Before the experiment, the staff shall respectively test whether the online music education reversal platform and the traditional knowledge reversal classroom platform on the Internet are smooth, and if there is any fault, timely repair the loophole to avoid affecting the final test results. After the preparation of the experiment, 100 users were selected randomly according to the data of the hottest popular science learning platform to determine the user experience of the final experiment.
- (2) After the experimental users are selected, each group is divided into 10 groups to experience the rollover platform for online music education. Each user is required to use the two platforms for an hour, immediately after the use of the platform test satisfaction and opinions. Until the last one is completed, the two staff on the spot results of statistics, as part of the final experimental results;
- (3) While 100 randomly selected test users experience, the login status of learning users in the same time of the two remote platforms is calculated, and the online learning time is another part of the final experimental results;
- (4) The on-site staff shall calculate the final results of the experiment at the ratio of 6 to 4 by using the experimental results of 100 randomly selected testers and the statistical test results of the computer background.

5.3 Analysis of Experimental Results

The result of the experiment is scientific, which not only integrates the experience of the learners, but also integrates the use of two different learning methods to avoid the chance of the result. The testers selected in this paper are those with learning ability and learning ideas, which avoids the occurrence of zero evaluation of individual test results and maintains the authenticity of the experimental results. The statistical tables of the specific experimental results are as follows (Table 2):

Table 2. User test satisfaction questionnaire for two Internet knowledge flip classroom platforms

User	Traditional music online education flip platform	Internet-based knowledge flipping classroom platform
Group I	Ordinary	Satisfy
Group II	Not bad	Satisfy
Group iii	Negative comment	Satisfy
Group iv	Negative comment	Satisfy
Group v	Good	Satisfy

The results of the statistical experiments are as follows (Table 3):

Table 3. Experimental results

Type/user	Traditional Music Online Education Flip Platform	Internet-based knowledge flipping classroom platform
Number of high praise	64 persons	99 persons
Number of poor judges	30 persons	1 person
Computer background computing platform usage	30%	80%

Comparing the user experience results of the two platforms, It can be seen that the use rate of the platform is higher than that of the traditional one, and the satisfaction rate is as high as 98%, and the poor rate is as low as 1%.

The reason for the above results is that the Music Online Education Turnover Platform designed in this paper has a unique resource operation module structure, in which the service application layer and the security layer coordinate with each other, logically collect knowledge resources and processing resources, and provide a secure and stable Music Online Education Turnover Platform. In addition, the security layer is a safe data circulation station of two knowledge reversal classroom platforms, which reduces the interference rate of bad information to the learners to a certain extent, and creates a safe learning environment for the Internet-based music online education reversal platform;

on the other hand, because the workflow of the Internet-based music online education reversal platform is cohesive, the control and scheduling of various resources form a unified management, the function confusion of the Internet-based reversal classroom platform will not occur, so that the learners have a good learning mood and improve the learning efficiency.

6 Conclusion

Through the scientific experiment, it is confirmed that the user experience of the music online education turnover platform based on Internet is better than that of the traditional one, and the learner can absorb more knowledge and improve learning efficiency. I believe that with the continuous upgrading of the Internet, the Internet will become the mainstream of learning mode, and the Internet-based music online education platform will be more convenient with the development of science and technology, the public life.

References

1. Teng, Y., Jiang, P.X., Wang, K.: Moral education teaching in colleges and universities based on the application of multimedia technology. *Int. J. Electr. Eng. Educ.* 2020:002072092094059 (2020)
2. Thai, N.T.T., De Wever, B., Valcke, M.: The impact of a flipped classroom design on learning performance in higher education: looking for the best ‘blend’ of lectures and guiding questions with feedback. *Comput. Educ.* **107**, 113–126 (2017)
3. Li, D.-H., Li, H.-Y., Wei, L., et al.: Application of flipped classroom based on the Rain Classroom in the teaching of computer-aided landscape design. *Comput. Appl. Eng. Educ.* **28**(2), 357–366 (2020)
4. Jing, L., Bo, Z., Tian, Q., et al.: Network education platform in flipped classroom based on improved cloud computing and support vector machine. *J. Intell. Fuzzy Syst.* **39**(99), 11 (2020)
5. Usai, F., Neil, K.O., Newman, A.J.: Design and empirical validation of effectiveness of LANA, an online game-based platform for second language learning. *IEEE Trans. Learn. Technol.* **1** (2018)
6. Tsai, C.W., Shen, P.D., Chiang, Y.C., et al.: How to solve students’ problems in a flipped classroom: a quasi-experimental approach. *Univ. Access Inf. Soc.* **16**(1), 1–9 (2017)
7. Valery, T., Shayan, S., Ksenia, D.: Design optimization and tolerance analysis of a spot-size converter for the taper-assisted vertical integration platform in InP. *Appl. Opt.* **57**(13), 3586 (2018)
8. Sanchez-Azqueta, C., Cascarosa, E., Celma, S., et al.: Application of a flipped classroom for model-based learning in electronics. *Int. J. Eng. Educ.* **35**(3), 938–946 (2019)
9. Estriegana-Valdehita, R., Barchino Plata, R., Medina-Merodio, J.A.: Educational technology in flipped course design. *Int. J. Eng. Educ.* **33**(4), 1199–1212 (2017)
10. Shiau, S., Kahn, L.G., Platt, J., et al.: Evaluation of a flipped classroom approach to learning introductory epidemiology. *BMC Med. Educ.* **18**(1), 63 (2018)
11. Fu, W., Liu, S., Srivastava, G.: Optimization of big data scheduling in social networks. *Entropy* **21**(9), 902 (2019)
12. Liu, S., Li, Z., Zhang, Y., et al.: Introduction of key problems in long-distance learning and training. *Mob. Networks Appl.* **24**(1), 1–4 (2019)

13. Liu, S., Glowatz, M., Zappatore, M., et al. (eds.): *e-Learning, e-Education, and Online Training*, pp. 1–374. Springer, Cham (2018). <https://doi.org/10.1007/978-3-319-49625-2>
14. Kaw, A., Clark, R., Delgado, E., et al.: Analyzing the use of adaptive learning in a flipped classroom for preclass learning. *Comput. Appl. Eng. Educ.* **27**(3), 663–678 (2019)
15. Murillo-Zamorano, L.R., Sanchez, J.L., Godoy-Caballero, A.L.: How the flipped classroom affects knowledge, skills, and engagement in higher education: Effects on students' satisfaction. *Comput. Educ.* **141**, 103608.1–103608.18 (2019)
16. Rathner, J.A.: The impact of flipped classroom andragogy on student assessment performance and perception of learning experience in two advanced physiology subjects. *Adv. Physiol. Educ.* **44**, 80–92 (2020)
17. Henbest, G.: Dissecting the flipped classroom: using a randomized controlled trial experiment to determine when student learning occurs. *J. Chem. Educ.* **97** (2020)
18. Brandon, D.T.: Unflipping the flipped classroom: balancing for maximum effect in minimum lead-time in online education. *J. Chem. Educ.* **97**(9) (2020)
19. Slivka, J.: A framework for teaching security design analysis using case studies and the hybrid flipped classroom. *ACM Trans. Comput. Educ.* **19** (2019)
20. Isherwood, G., Taylor, K., Burnside, G., et al.: Teaching orthodontic emergencies using the “flipped classroom” method of teaching—a mixed methods RCT. *Eur. J. Dent. Educ.* **24**(1), 53–62 (2020)
21. Rubio-Fernández, A., Muñoz-Merino, P.J., Delgado Kloos, C.: A learning analytics tool for the support of the flipped classroom. *Comput. Appl. Eng. Educ.* **2019**(1) (2019)
22. Kelliann, C., Fee-Schroeder, et al.: Flipped classroom strategy: an accessible, application-driven approach to genomics education. *Clin. J. Oncol. Nurs.* (2019)