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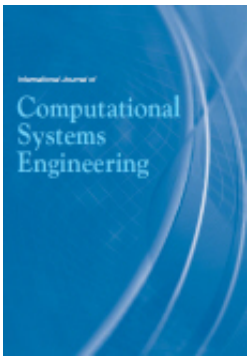

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Application of MOOC+SPOC mixed teaching in athletics professional courses in colleges and universities

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Abstract: In the context of Education Modernisation 2.0, this paper discusses the current situation of athletics teaching in colleges and universities, and expounds the application of 'MOOC+SPOC' mixed teaching in athletics teaching in colleges and universities. In the post-COVID-19 era, MOOC+SPOC combined teaching has become an important orientation in the teaching reform and innovation of many universities in China. Many practical activities show that the mixed teaching method has promoted the reform and innovation of teaching, and has achieved certain results in improving the actual teaching effect. MOOC are used to fill the defects of SPOC teaching network resources, to carry out purpose-oriented teaching with SPOC, to deal with many problems caused by the wide coverage of MOOC and the lack of constraints caused by the wide coverage, and to carry out mixed teaching combined with physics courses, to complete the co-creation of disciplines in ordinary high school athletics teaching.

Keywords: massive open online courses; MOOC; small private online courses; SPOC; mixed culture education; universities; athletics.

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1 Introduction

With the development of the internet, online courses are becoming increasingly popular. By integrating websites such as massive open online courses (MOOC), online learning banks, and smart trees from Chinese universities, using professional teaching tools such as Yu Classroom and Learning Link, and applying information technologies such as digital learning and smart classrooms, online MOOC+Single point teaching is student-centred and based on specific overall teaching objectives. Select and build high-quality online courses such as MOOC and small private online courses (SPOC), deeply integrating online course learning, end-to-end rotation of professional learning, and online zero distance teaching to achieve personal goal improvement. SPOC usually refers to small-scale restricted online courses. The concept of SPOC was first proposed and used by foreign professors. During the outbreak of COVID-19 in 2020, most teachers in colleges and universities have opened various online courses, of which about 38% use the combination of MOOC and SPOC. The theory and practice of MOOC+SPOC blended teaching have achieved some results in the implementation of MOOC+SOC teaching in Chinese universities, but there are also many problems (Pozon-Lopez et al., 2020). Therefore, the shortcomings of scientific research and preventive measures are of great significance for adjusting and improving traditional course content, utilising existing internet teaching network resources, and constructing a comprehensive hybrid teaching method that takes into account the competitiveness of internet teaching after returning to school.

For MOOCs, SPOC is a rising star, trying to improve and hope for MOOCs, but it does not mean that SPOC is necessarily more advanced than MOOCs, or SPOC must be able to replace MOOCs. On the contrary, both MOOCs and SPOCs have their own irreplaceable value, and it is a great contribution to the education industry to develop a more reasonable online course model by learning from each

other's advantages while giving full play to their own characteristics and advantages.

First of all, SPOC not only promotes the external brand effect of the university, but also promotes the teaching reform inside the university and improves the teaching quality. Secondly, the construction of curriculum system is relative to the cultivation of talents. With the needs of the local society as the core, the specific requirements of various specific jobs on the knowledge, ability and quality of talents are analysed in detail, the personnel training methods of various majors are optimised in a timely manner, and the professional Settings and curriculum Settings are updated to build application-oriented talents required by enterprises. Thirdly, while making full use of SPOC, we can expand the depth and wide health of actual combat, liberate teachers from repeated teaching of each class, and strengthen counselling and ability training.

In the traditional classroom, teachers often teach and students are in a subordinate position, while the SPOC platform focuses on students' active absorption of knowledge rather than passive listening, which helps to improve students' subjective initiative. Different from the traditional model, teachers will publish teaching videos, teaching courseware, reading e-books and other learning materials on the platform for students' self-study before class, collect students' questions about the content of self-study before class, answer questions in class, analyse and solve students' problems in a deep level.

Teachers can adjust the teaching plan appropriately according to the actual situation of students, redistribute the proportion of each part of the classroom content, pay more attention to the learning needs of students, and better grasp the acceptance degree and personalised characteristics of each student. According to the initial entry conditions set for learners, students are divided into horizontal and vertical layers, and each level is taught separately, and exclusive teaching programs are customised for students. Select and subdivide students of different majors, and arrange corresponding courses respectively; recommended learning content for different grades. Through the SPOC platform, teaching is divided into different sections to achieve horizontal and vertical stratified teaching, so that students can get what they need and be more targeted, which can effectively improve learning efficiency.

Literature research shows that many scholars have studied and analysed the mixed teaching mode of 'MOOC+SPOC'. For example, some scholars have analysed the mixed teaching mode of 'MOOC+SPOC' based on the real-time interactive perspective. Some scholars have studied and designed a hybrid teaching model based on 'MOOC+SPOC' deep learning, and demonstrated the course 'advanced language programming' as an example. Some scholars have explored the construction and teaching implementation process of 'MOOC+SPOC' in medical statistics teaching. Some scholars use the 'Python' course as an example. This paper explores the preparation, implementation and evaluation of 'MOOC+SPOC' teaching. Some scholars take 'advanced application of office software' course as an example to study the reform and practice of 'MOOC+SPOC' mixed teaching mode. To sum up, the research on the 'MOOC+SPOC' teaching mode is still in the initial stage, and there are still many research gaps, among which, the research results on the integration of this teaching mode in sports classes, especially college track and field classes are still rare. In future research, the focus of research should be shifted to the mixed teaching mode, which can bring more benefits to the teaching effect under this teaching mode. Therefore, compared with the existing research. The marginal contribution of this paper lies in: on the one hand, it enriches the research content of 'MOOC+SPOC' teaching mode; on the other hand, it deepens the research of this sports field.

2 Hybrid teaching method of MOOC+SPOC

The MOOC+SPOC hybrid teaching mode utilises a variety of MOOC teaching resources and flexible SPOC course mode, gives full play to the advantages of traditional classroom synchronous conversation, effective supervision and other scenarios, and produces relatively stable teaching logic and structure. It is an effective way for universities to promote teaching reform and innovation and teaching quality (Chaker and Impedovo, 2021). There are also significant differences, as Table 1 shows.

Table 1 Differences between MOOC and SPOC

Project	*MOOC*	*SPOC*
Teaching object	Anyone	Restricted group
Teaching scale	Large scale	Small scale
Mode of communication	Online communication	Online + offline communication
Teaching process	Short	Long
Teaching evaluation	Online	Online + offline
Teaching resources	Abundant	Restriction
Course completion rate	Lower	Higher
Course conditions	Unconditional	Conditional

2.1 Relevant definitions

MOOC open large-scale online courses MOOC, in the form of a series of products and micro-courses to show key teaching specific content, the course content coverage is wide, the total number of online learning will not be restricted by traffic. Through the internet, students will not be limited by time and space. They can easily choose course network resources according to their needs and carry out interactive communication. MOOC has many advantages, such as large scale, novel forms, rich resources and open cultural education. However, in the process of development, disadvantages of MOOC also become more and more

prominent (Xiaotian, 2022). The simple way and lack of targeted learning guidance are not conducive to the development of bricks-and-mortar teaching in colleges and universities. Small-scale and relatively limited online lecturing SPOC just develops from the deficiency of MOOC. The common application of SPOC belongs to on-campus SPOC. The number of students is usually between dozens and hundreds, and the authority of students is relatively limited. As shown in Figure 1, under the premise of reflecting the innovation of MOOC ideas and specific content, the innovative teaching process and method of SPOC is an important supplement to general teaching (Onah et al., 2021).

2.2 Implementation process of athletics class

MOOC+SPOC hybrid teaching with wisdom classroom approach; The course content combining professional knowledge, ability and emotion of classroom teaching objectives is closely combined with correct guidance and supervision in the expansion of target direction of teaching, so as to arouse students' learning initiative and consciousness (Soufiane et al., 2022). Generally speaking, the implementation of athletics teaching is divided into three stages: teaching preparation, classroom face-to-face teaching and course summary. The process of the mixed teaching mode of MOOC+SPOC is shown in Figure 2.

Figure 1 Mixed teaching mode of MOOC+SPOC (see online version for colours)

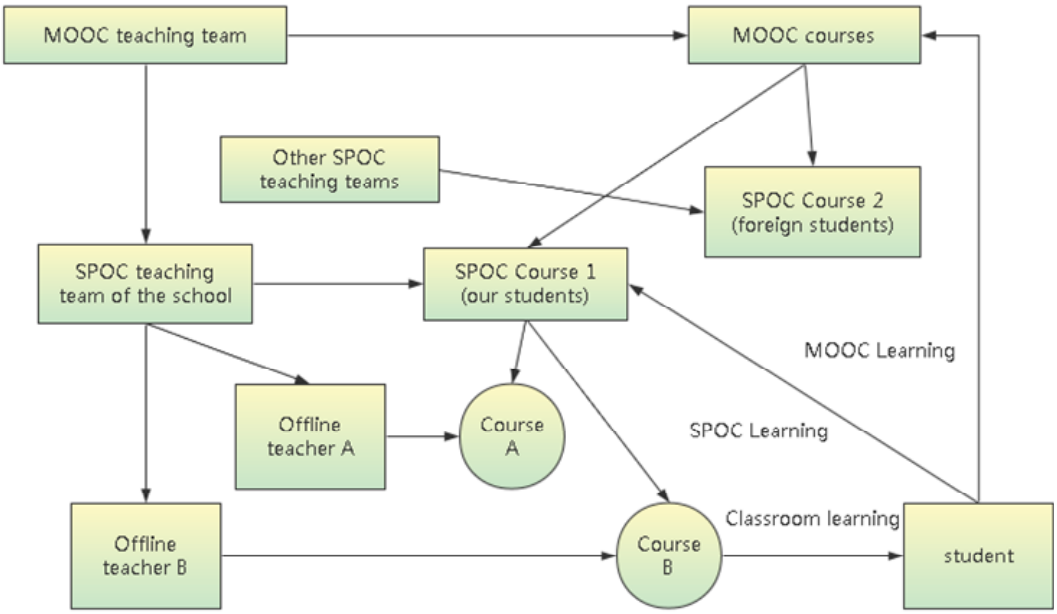


Figure 2 Flowchart of the mixed teaching mode of MOOC+SPOC (see online version for colours)

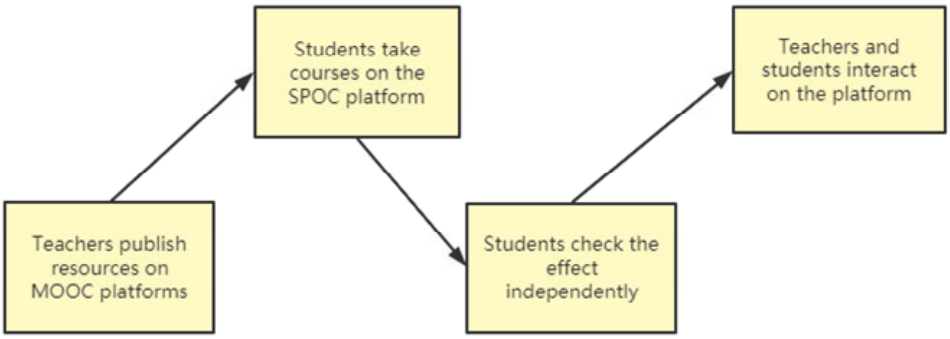


Figure 3 Basic flow chart of athletics teaching preparation (see online version for colours)

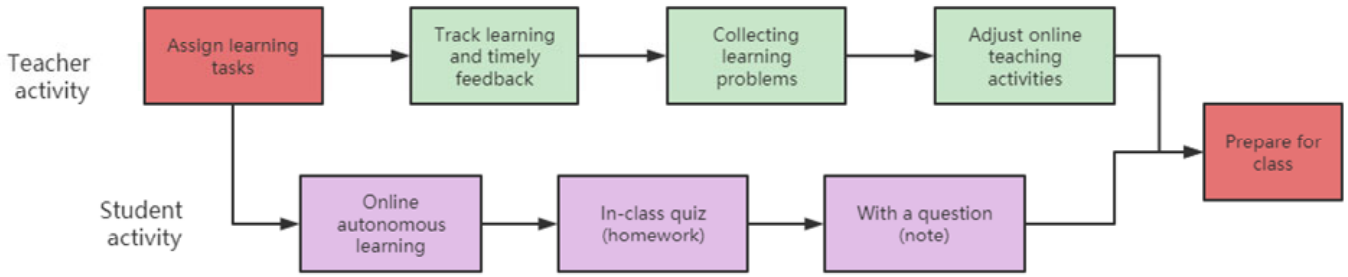
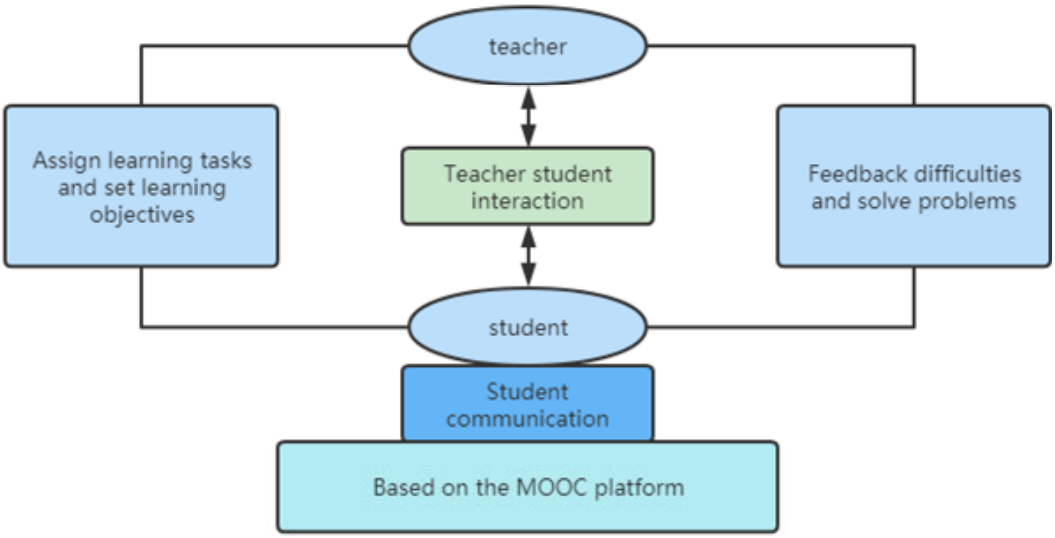


Figure 4 SPOC preliminary learning stage model (see online version for colours)



2.2.1 Preparation for athletics teaching

Teaching preparation is the beginning of mixed teaching, and the key work is teaching plan design, combing and combining educational resources, setting and releasing task points (Yulianto et al., 2018). On the premise of fully understanding students' professional knowledge, the design of athletics teaching plan analyses curriculum objectives, curriculum content and educational objects, and constructs educational resources scientifically and reasonably. By combing educational resources and combining with the specific content of MOOC, professional knowledge, knowledge expansion and extra-curricular knowledge sorting and integration are carried out, which are presented in various forms such as short videos, micro courses, course standards, teaching design and chapter detection. The task points of athletics teaching are set and distributed according to the needs of course objectives and different types of educational resources, so as to monitor the learning experience and progress of students in the system in real time and grasp their learning status (Lin, 2021). Figure 3 shows the basic flow of class.

2.2.2 Face-to-face teaching in athletics class

The mixed teaching stage should reflect the education idea that students are the main body. As can be seen in Figure 4, in athletics teaching, teachers should not simply teach knowledge, but correctly guide students to express, discuss and think independently in combination with the teaching strategies of wisdom classroom, so as to improve students' cognition and understanding of traditional culture (Sim et al., 2019). First, the teacher clearly pointed out the difficulties encountered by students in the classroom learning process, and the students could communicate and discuss. Then, the experts taught the specific content and key knowledge, and the key questions and doubts were answered. Finally, conduct professional knowledge testing in SPOC to promote the improvement of classroom teaching effectiveness.

2.2.3 Athletics course summary

The course summary process is the link of combing, improving, digesting and absorbing. Teachers can also think about the existing problems and summarise experience according to the learning situation and effect of students' courses, so as to adjust the design and management of teaching plans in the following chapters and improve the network resources of SPOC. Students should build the main vein of professional knowledge and promote the absorption of professional knowledge according to their own learning results (Yousef and Sumner, 2021). After class, teachers can also post different challenge questions with answers analysis on SPOC for students to complete in time, so as to provide interactive communication and answer questions.

3 Predicament and countermeasures encountered by key athletics courses in ordinary colleges and universities

3.1 Difficulties encountered by key athletics courses in colleges and universities

On the other hand, due to the current limitations, some cultural education ignores how to cultivate students' fitness concept, fitness ability and fitness habit according to athletics classes. At present, due to the limitation of the course content, the limitation of the teaching content and the excessive exercise intensity in the study of athletics, the students' physical and psychological pressure is brought to a certain extent, resulting in some adverse physiological and psychological reactions (Yu, 2018). The students are completely in passive training, unable to enjoy hobbies. Due to the role of external environment and small environment of all walks of life, many colleges students' cognition of athletics fitness has formed errors. 56% of students think

that the value of athletics fitness can be replaced by sports events, and that the classroom teaching of athletics can only rely on the teaching mode of competition to improve students' athletic technical strength. According to the athletics class learning training students' fitness ability, shape better fitness habit, in the level of full human quality, the understanding is not in place. However, these aspects happen to be part of today's health education knowledge. The teaching content is too old, the teaching mode is single, and the students feel tired of choosing the particular period.

3.2 Improvement measures for athletics courses in ordinary universities

3.2.1 The target task of athletics education should be changed

With the reform of basic education in colleges and universities, athletics professional subjects still need to develop from competitions into lifelong subjects. However, there is no escaping the unique charm of the game. In the more professional teaching of athletics should also attach great importance to this feature (Guo, 2019). Under this premise, the teaching model of athletics should be changed to make full use of the fitness effect of athletics. In teaching, students should first have a new cognition and understanding of athletics subjects. They are committed to exploring the potential of extreme sports for students. By training in this way, they can achieve all-round development of mind and body.

3.2.2 Students' fitness concept, fitness ability and fitness habit should be dominated

We should flexibly use the advantages of athletics fitness, shape students' comprehensive ability and accomplishment, and constantly strengthen students' initiative, so that students highlight their own characteristics, so that athletics courses are more suitable for the needs of today's college students.

3.2.3 Students' basic fitness knowledge and common health knowledge

Nowadays, the course outline is worse in the allocation of basic knowledge and learning, and the theoretical learning is more and more highly valued by universities. Through some fitness exercises, integrating basic knowledge, system software and comprehensive teaching students how to carry out fitness exercises reasonably, and through the classroom teaching of athletics class to enable students to fully and comprehensively grasp the nature of athletics, according to the practice and theoretical course learning, make students deeply realise the importance of learning and training athletics.

3.2.4 Rebuild a new evaluation standard and evaluation index system of athletics fitness

Athletic events and techniques should not be the sole criteria for the examination of athletics disciplines. The assessment scheme should fully reflect the comprehensive ability and ability of students after learning and training athletics course content (Wang, 2019). It mainly includes:

1 The range and size of all kinds of literacy after carrying out all kinds of fitness sports.

2 Students' reasonable use of basic knowledge to guide their own training ability.

3 The stability of each physiological function level and the good and bad aspects of integration ability.

4 The construction of 'MOOC+SPOC' mixed teaching model and its application in athletics teaching

4.1 Function design and model construction of 'MOOC+SPOC' mixed teaching mode in athletics class

The 'MOOC+SPOC' teaching model, which is closely combined with the athletics classroom, can play its role. Athletics teaching is conducive to communication between teachers and students as well as communication and cooperation among students (Kovanovic et al., 2019). MOOC service platform can provide a wide range of teaching resources. SPOC is a virtual platform conducive to teachers' questions and doubts, assessment and supervision, and subject rotation, providing activities in and out of class (De Moura et al., 2021). The cyclic structure among the three is shown in Figure 5.

Figure 5 Support for mixed athletics teaching in MOOC, SPOCs and physical classrooms (see online version for colours)

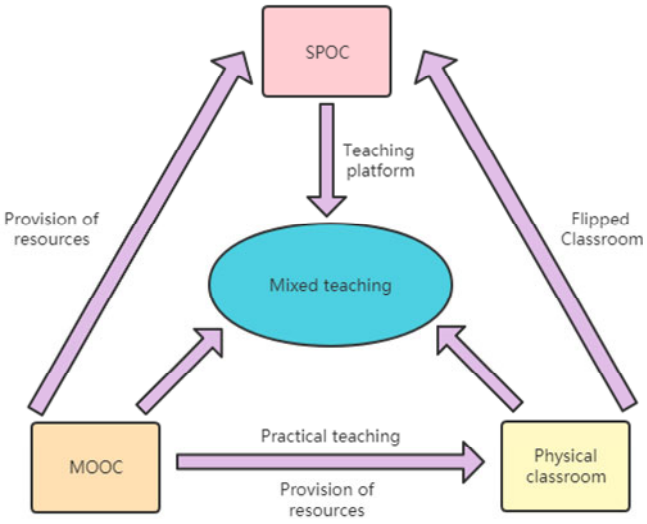
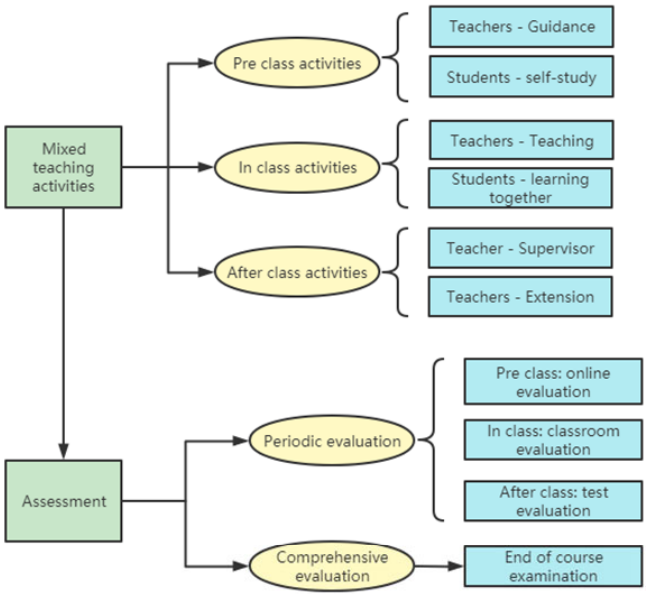


Figure 6 Athletics course model design under the mixed teaching mode of 'MOOC+SPOC' (see online version for colours)



The essence of this kind of teaching mode is that teachers recommend high-quality MOOC network resources to students according to WeChat chat group, cloud course content or QQ group and other communication and communication systems. Embed self-made SPOC to carry out the mixed teaching mode of college athletics classroom based on SPOC smart classroom according to 'network learning – teaching process – assessment', as shown in Figure 6.

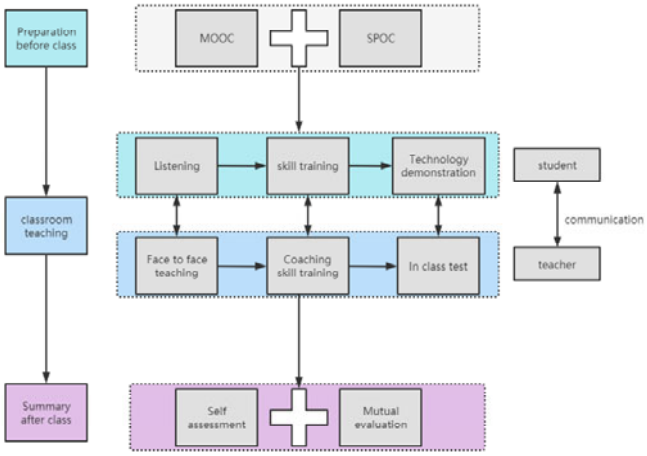
4.2 *Allocation of cultural and educational resources in athletics teaching courses*

Higher education should carry out differentiated teaching according to the student population. Taking public course college athletics teaching as an example, it mainly carries out personalised teaching for students, and MOOC resources are given to students for independent learning and learning. Here, SPOC, or open and diversified resources, is the learning content that creates local characteristics based on curriculum standards, curriculum characteristics and training plans of public courses (Hidalgo et al., 2020).

4.3 *Design of teaching steps in athletics teaching*

Internet learning activities are rich and colourful, including tutorial videos, question banks, game links, testing, etc. Students feel very happy during the learning process by checking in and learning. Teachers track students' learning status according to the internet platform and form learning evaluation. Under such a mixed teaching mode, teachers can help and supervise students, teachers and students can discuss and complete the combination of learning and thinking. Figure 7 shows the content in the physical classroom teaching model of athletics.

Figure 7 Athletics physical classroom teaching model design (see online version for colours)



4.3.1 *Athletics teaching before class teaching activities*

In the course of athletics teaching, the important goal of teachers is to specifically guide students to preview before class, search high-quality MOOC resources, select resources in line with curriculum content to be incorporated into SPOC, and let students participate in learning (Wang et al., 2019). According to the characteristics of the SPOC service platform, track and supervise the learning status of students, communicate with students, and carry out questions and answers.

4.3.2 *Athletics classroom teaching activities*

This link is the key of the subject, only through self-study in class or a single course content rotation is far from enough. In this link, the primary task of all teachers and students is to read together. As the planner of athletics classroom teaching activities, teachers participate in students' exploration activities and assist students to solve doubts (Wang and Zhao, 2019). Teachers can use the tracking and monitoring of students' MOOC class in athletics classroom activities and the analysis of SPOC personality learning to sum up problems and set up important problems in classroom teaching.

4.3.3 *After-class activities of athletics teaching*

At this time, the primary task of all teachers and students is to extend the course, that is, to summarise the main content of the course and expand the specific content of learning. For example, summarise and improve classroom and athletics activities, carry out achievement exhibition, expand new knowledge and extend study exploration, etc. (Padilla Rodriguez et al., 2020). Learning athletics solely in class is not enough, Students must learn deeply after class and apply what they have learned to practical activities.

4.4 Athletics teaching evaluation curriculum assessment design

Elective courses in universities generally have more specific content and fewer class hours, but they are highly theoretical. If students are judged only by going to work and taking final exams, the results of performance assessment will be different. In the internet environment, 'MOOC+SPOC' online learning is closely combined with athletics classroom learning, forming a comprehensive assessment of students, and the conclusion is more real. The evaluation indexes of college courses are shown in Table 2. Big data is used to record students' learning trajectory, and AI is used to analyse reports, record students' learning situation data and historical tracking, and teach each student in accordance with their aptitude.

Table 2 Evaluation indicators

Assessment method	*Assessment content*	*Total per minute*	*Percentage/ %*
Online evaluation	Unit test 60 points	100	40
MOOC+SPOC	Interactive discussion 40 points		
Offline assessment	Seminar 40 points	100	40
Discussion + test	The final test is 60 points		
Practice assessment	Practical class	100	20

After the completion of one cycle time, according to the specific importance of each unit, set the proportional coefficient related to each module, multiplied by the module score is the final formation of learners.

$$G_i = \sum_t^n W_t G_i^t \tag{1}$$

The learner test is comprehensive. The one calculated by a certain proportion of formation and examination shall be the final one of students, in which m and n are proportional constants.

$$G = mG_i + nP_i \tag{2}$$

Quantitative analysis was conducted on the actual learning outcomes of students, and the learning scores for each chapter of each learner were calculated for each stage as an enterprise. Applying a learner's stage learning, there are a total of n stages, representing the number of difficult stages i in the test papers produced for today's learners. Here, k is a constant.

$$S_i = k/G_i \tag{3}$$

The more students in a stage, the better their mastery of the relevant knowledge points in that stage. The fewer questions related to the key knowledge at that stage when making the test paper. This method helps learners discover their shortcomings within a limited time, greatly improving learning efficiency. Therefore, the index can be as follows.

$$S_1 : S_2 : S_2 \ldots S_n = (k/G_1) : (k/G_2) : (k/G_1) \ldots (k/G_n) \tag{4}$$

that is:

$$S_1 : S_2 : S_2 \ldots S_n = (1/G_1) : (1/G_2) : (1/G_1) \ldots (1/G_n) \tag{5}$$

When evaluating students, the teacher calculates the scores of all learners to obtain the overall target ratio. The mean value of students indicates the learning level of the whole students, taking this as a reference to accurately measure the level of students themselves, which has a very good difference and can also reflect the importance of students in the whole. The correlation between the two is calculated and analysed quantitatively according to the following formula.

$$\overline{S} = \sum_i^n \left(S_i' - S_i\right)^2 / 2 \tag{6}$$

In the examination paper, customers should set the proportion of questions of different levels according to their learning status, that is, the difficulty coefficient ratio of the overall objective questions. The difficulty index H of the overall objective examination paper can be shown as:

$$H = \sum_i^m \left(H_i \Big/ \sum_i^m H_i\right) * i \tag{7}$$

From equation (7), it can be concluded that H':

$$H' = \sum_i^m \left(H_i' \Big/ \sum_i^m H_i'\right) * i \tag{8}$$

The difficulty index H of the overall objective test paper and the difficulty coefficient index H' of the self in the species at this stage are calculated by the following formula for quantitative analysis

$$\overline{H} = \left(H_i' - H_i\right)^2 / 2 \tag{9}$$

The shorter the time, the poorer the quality of learning, showing a positive correlation as shown below.

$$f = 1 - \alpha\overline{S} - \beta\overline{H} \tag{10}$$

And their influence weight value is constant, can be combined with the actual situation. f represents the adaptability of the sample. The closer the value is to 1, the more the test paper produced will meet customers' expectations.

Online learning can be achieved through remote real-time monitoring on MOOC and SPOC platforms, such as the activity level of students' online learning discussions, homework progress, study time changes, study time cards, etc. Teaching evaluation refers to the evaluation used by teachers in teaching and students' practical activities after class. This assessment includes subjective assessments by teachers through interactive classroom teaching, student work group activities, and learning status, as well as

objective analyses such as attendance, internet learning testing, and final exams.

5 The application and advantages of 'MOOC+SPOC' mixed teaching in the content teaching of school athletics courses

Athletics is a new event sought after by students in colleges and universities, but because of the weak teaching faculty and single teaching method, students are in a very passive learning situation. Such a thing is not conducive to the completion of the overall goal of athletics teaching, unable to shape the birth, heart, spirit all-round sustainable development of students. In view of this problem, experts and professors believe that it can be effectively solved from the right choice of teaching content, effective sports intelligent teaching methods and other aspects. The application of 'MOOC+SPOC' mixed teaching to ordinary high school athletics courses is essentially the use of high-quality teaching network resources with a large number of MOOC service platforms, or teachers recording relevant teaching network resources (Liu, 2022). SPOC is committed to transforming the traditional teaching structure of athletics teaching in colleges and universities, generating new teaching methods that can not only play a guiding role in teaching, but also inspire students, learning autonomy and consciousness. The composition diagram of learner resources is shown in Table 3.

Table 3 Composition diagram of learner resources

Learner resources	*Index*
Before class	Reference material
	Think about the problem
	Learning experience
In class	Class notes
	Classroom questioning
	Learning experience
After class	Knowledge video
	Study notes
	Learning experience
	Problem discussion

5.1 Athletics teaching before class

5.1.1 Teachers prepare teaching resources in advance

Based on students' situation and overall teaching goal, athletics teachers use MOOC service platform of Chinese universities to form their own same SPOC athletics teaching course content. In SPOC class, teachers announce short teaching videos and course requirements one week in advance (Wang and Wang, 2021).

5.1.2 Students' learning of pre-knowledge

Students learn the basic theories of athletics events online through the SPOC teaching service platform, play athletics videos, and conduct individual and group training. In the course of watching the athletics teaching videos, the students were instructed to integrate the basic principles of athletics posture to carry out imitation training. According to the online course management system, teachers can master students' classroom learning status and provide reference for the centralised processing of online courses or some processing problems.

5.2 Middle stage of athletics teaching

5.2.1 Organisation and coordination of teachers' cultural education

Teachers use information technology to analyse the learning status of students in class and provide data basis for the next development of athletics teaching resources. Teachers concentrated on introducing and dealing with the common problems encountered by students in the process of self-learning by using the public selection of courses in athletics classroom teaching; It is able to provide individual guidance for common problems encountered by some students or working groups in athletics teaching, and assign students to choose group cooperative learning and training for difficult athletics movement details after group discussion. In the part of the course summary, the teachers were divided into groups to show the effectiveness of athletics teaching and learning. The part-time teachers and other team members could comment on each other (Ossiannilsson et al., 2016).

5.2.2 Intrinsic knowledge of students' classroom teaching

The guidance of teachers and students' participation in learning and practical activities make students' basic knowledge of athletics and professional skills further intrinsic. At the same time, the communication between teachers and students and between students is further deepened. These are of great help to straighten students' attitude towards athletics classroom learning and arouse students' enthusiasm for athletics classroom learning.

5.3 After-school stage of athletics teaching

After class, after the completion of an athletics teaching activity, teachers improve the athletics teaching plan on the premise of looking back, commenting, summarising the teaching content and the actual effect. Students cooperate with teachers to evaluate the teaching effect of athletics, summarise and reflect on the problems existing in the whole process, and strengthen the professional knowledge of athletics after class. In this way, students can not only improve the enthusiasm of learning, but also stimulate the fun of learning athletics courses, and consolidate students' learning results.

5.4 Advantages of 'MOOC+SPOC' mixed teaching in school athletics course content teaching

The mixed teaching method of 'MOOC+SPOC' often prevents the single teaching method of the required teaching video with the traditional teaching method in the teaching process, and transforms the traditional teaching from the unilateral teaching with static data to the dynamic mode of mutual comment and reflection, which promotes the long-term teaching effect of athletics (Pillai and Sivathanu, 2020). Teachers and students benefit a lot from this teaching mode, mainly in the following aspects:

1 Teachers can use online athletics course resources to specifically guide students to prioritise learning and training, and then expand and improve online athletics courses.

2 By comparing the pre-study status of students, teachers can make targeted introduction and demonstration in the online course of athletics, which can make the teaching hours more efficient.

3 During the implementation of 'MOOC+SPOC' mixed teaching method, teachers select MOOC in class to carry out SPOC to clarify the steps of athletics teaching activities, discuss and interpret the demonstration in teaching, and further deepen the understanding of the new teaching system in the process of teacher-student interaction, summary and evaluation.

4 Teachers combine their athletics professional skills and technology with intelligent information content technology to greatly improve their teaching organisation and coordination ability.

5 Shaping students' enthusiasm and teamwork spirit in the process of participating in this way of learning.

6 Problems and suggestions of 'MOOC+SPOC' mixed teaching in the teaching of athletics courses in schools

6.1 Problems

6.1.1 The role of 'MOOC+SPOC' online learning platform for athletics teaching is not yet complete

In the process of athletics teaching, there is no good communication between teachers and students according to the electronic display screen, and homework cannot be submitted. The online viewing of athletics teaching videos is blocked, and the learning effect is poor.

6.1.2 Students' pressure intensifies

Under the premise of improving the learnable efficiency of the teaching field in the design of athletics topics in ordinary high schools, the students showed that this reduced their free time and enhanced their learning and training pressure.

6.1.3 Insufficient teacher time

When conducting 'MOOC+SPOC' mixed teaching, athletics teachers need not only online question-and-answer, information management and online monitoring, but also organise students' online teaching activities and carry out after-class evaluation, which requires a lot of teachers' free time.

6.2 Suggestions

6.2.1 Improve the athletics teaching system platform

Improve the reliability of the website by improving the online athletics teaching platforms related to MOOC and SPOC.

6.2.2 Adjust the teaching time of athletics

The leading cadres of the dean's office adjusted the class hours according to the teaching design of athletics teachers. Meanwhile, the athletics teachers suggested that the forefront of athletics classroom teaching would affect students' academic performance, and encouraged students to actively carry out daily tasks on the internet.

6.2.3 Establish a cultural and educational guarantee system for athletics

In the mixed teaching of 'MOOC+SPOC', exploration can be conducted from the following three aspects to cultivate high-level athletics teaching teams. One is to construct a high-quality athletics teaching system according to the teaching management model. Secondly, organise and coordinate student committees with teaching abilities, inviting them to participate in the applied teaching of athletics teaching teams. Thirdly, teachers should increase the review of students' learning processes to promote teaching effectiveness.

7 Conclusions

'MOOC+SPOC' mixed teaching mode is the inevitable choice of higher education reform and innovation. According to mixed teaching, students can standardise various skills, enhance the cognition of the new project strategy, and make students interested in the course content and actively carry out activities. The teaching method of this mode is a necessary substance for the modernisation of information content. It can transform the traditional teaching from static data unilateral teaching to the dynamic mode of mutual comment and reflection, improve the teaching organisation process of part-time teachers and enhance students' learning enthusiasm, so as to achieve the overall goal of online teaching efficacy. Finally, through this scientific research, it can bring some inspiration to the application of 'MOOC+SPOC' mixed teaching, and also promote the rapid development of intelligent teaching reform and innovation in colleges and universities.

Therefore, there are many areas worth thinking about in the future how to apply the 'MOOC+SPOC' mixed teaching method to the whole process of talent training in regional universities, which must be gradually improved based on the actual situation, social development and the joint efforts of teachers and students.

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References

Chaker, R. and Impedovo, M.A. (2021) 'The moderating effect of social capital on co-regulated learning for MOOC achievement', *Education and Information Technologies*, Vol. 26, No. 1, pp.899–919.

De Moura, V.F., De Souza, C.A., Viana, N. and Backx, A. (2021) 'The use of massive open online courses (MOOC) in blended learning courses and the functional value perceived by students', *Computers & Education*, February, Vol. 161, pp.104077.1–104077.14.

Guo, L. (2019) 'The importance and countermeasures of physical training in athletics teaching in colleges and universities', *Contemporary Sports Science and Technology*, Vol. 9, No. 15, pp.105–107.

Kovanovic, V., Joksimovic, S. and Poquet, O. (2019) 'Examining communities of inquiry in massive open online courses: the role of study strategies', *The Internet and Higher Education*, January, Vol. 40, pp.20–43.

Lin, D. (2021) 'Research on the application of MOOC+SPOC mixed teaching in yoga teaching in colleges and universities', *Contemporary Sports Science and Technology*, Vol. 11, No. 4, pp.96–98.

Liu, F-f. (2022) 'Research on problems and countermeasures in MOOC+SPOC mixed teaching', *Office Automation*, Vol. 27, No. 18, pp.36–38, p.58.

Onah, D.F.O., Pang, E.L.L., Sinclair, J.E. and Uhomoibhi, J. (2021) 'An innovative MOOC platform: the implications of self-directed learning abilities to improve motivation in learning and to support self-regulation', *The International Journal of Information and Learning Technology*, Vol. 38, No. 3, pp.283–298.

Ossiannilsson, E., Altinay, F. and Altinay, Z. (2016) 'MOOCs as change agents to boost innovation in higher education learning arenas', *Education Sciences*, Vol. 6, No. 3, p.25.

Padilla Rodriguez, B.C., Armellini, A. and Rodriguez Nieto, M.C. (2020) 'Learner engagement, retention and success: why size matters in massive open online courses (MOOC)', *Trends in Ecology & Evolution*, Vol. 35, No. 1, pp.46–62.

Palacios Hidalgo, F.J., Abril, H., Parra, C.A. and Gomez, M.E. (2020) 'MOOC: origins, concept and didactic applications: a systematic review of the literature (2012–2019)', *Technology, knowledge and Learning: Learning Mathematics, Science and the Art in the Context of Digital Technologies*, Vol. 25, No. 4, pp.853–879.

Pillai, R. and Sivathanu, B. (2020) 'An empirical study on the online learning experience of MOOC: Indian students' perspective', *The International Journal of Educational Management*, Vol. 34, No. 3, pp.586–609.

Pozon-Lopez, I., Kalinic, Z., Higueras-Castillo, E. and Liebana-Cabanillas, F. (2020) 'A multi-analytical approach to modeling of customer satisfaction and intention to use in massive open online courses (MOOC)', *Interactive learning Environments*, Vol. 28, Nos. 5/8, pp.1003–1021.

Sim, A.T.H., Saadatdoost, R., Jafarkarimi, H. and Hee, J.M. (2019) 'Understanding MOOC learners: insights from participation in Coursera MOOC', *International Journal of Web-Based Learning and Teaching Technologies*, Vol. 14, No. 1, pp.93–112.

Soufiane, O., Mohamed, E. and Mohamed, K. (2022) 'Proposal of a flipped classroom model based on SPOC', *RA Journal of Applied Research*, Vol. 8, No. 5, pp.363–367.

Wang, H., Zhao, H. and Yu, J. (2019) 'Current situation analysis and development countermeasures of sports curriculum construction of MOOC in Chinese universities', *Journal of Wuhan University of Physical Education*, Vol. 53, No. 8, pp.69–75.

Wang, J. and Zhao, S. (2019) 'Research on blended teaching model based on MOOC+SPOC', *Modern Commerce and Industry*, Vol. 40, No. 29, pp.180–181.

Wang, L. and Wang, M. (2021) 'Application of MOOC in physical education teaching mode under the background of big data', *Journal of Physics: Conference Series*, Vol. 1744, No. 4, pp.042–233.

Wang, Z. (2019) 'Discussion on athletics teaching reform of physical education major in Chinese universities', *Journal of Zhengzhou Railway Vocational and Technical College*, Vol. 31, No. 2, pp.94–96.

Xiaotian, D. (2022) 'Open and sharing strategy of online classroom based on 'MOOC+SPOC'', *Western Quality Education*, Vol. 8, No. 10, pp.122–124.

Yousef, A.M.F. and Sumner, T. (2021) 'Reflections on the last decade of MOOC research', *Computer Applications in Engineering Education*, Vol. 29, No. 4, pp.648–665.

Yu, H. (2018) 'Research on the dilemma of athletics teaching in colleges and universities and the countermeasures of teaching reform', *Contemporary Sports Science and Technology*, Vol. 8, No. 9, pp.62–64.

Yulianto, B., Prabowo, H., Kosala, R. and Hapsara, M. (2018) 'Implementation of learning analytics in MOOC by using artificial unintelligence', *Journal of Computer Sciences*, Vol. 14, No. 3, pp.317–323.