Innovation of MOOC+SPOC online and offline hybrid teaching mode based on OBE concept – Take Chorus Teaching as an Example

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Abstract

The purpose of this research lays in the fact that nowadays there are plenty of investigations concerning the influence of hybrid teaching on the real educational process. In the era of COVID-19 this topic gained additional influence and impact on ordinary people. The research background shows us that there were no types of research works concerning this issue, which stresses additionally the research significance. It can show us clearly the research significance, which is to demonstrate the development of innovations of MOOC+SPOC online and offline hybrid teaching. During this research we show that hybrid teaching have both drawbacks and advantages. The aim of this research are: 1) to describe modern approaches to MOOC+SPOC online and offline hybrid teaching. We must clearly find out how online and offline teaching can be combined with each other. We will take chorus teaching as an example, because is the most difficult thing, in our opinion, to be taught online. 2) To find out some new particles of this phenomenon, that haven't been mentioned before in the previous investigations. The results of our work are the following: 1. Nowadays online teaching is very actual, but it can't be applied to chorus singing, because it must be taught offline with seeing in real life your student. Online instruments can serve just as additional tools for face-to-face meeting. For example, theory can be taught online by self-education of the student. 2. Not every sphere of education can be done with the help of online teaching.

Introduction

The purpose of this article is to reveal the main aspects of the development of choral education in modern Russian universities.

The assumption was made that nowadays we should stick to our traditions is every part of choral singing.

Nowadays no one has doubts that choral singing plays a big role both in music as well as in national traditions. It is very necessary to stress the fact that it is a big part of peculiarities of Russian national traditions.

Moreover, it has a lot of things in common with politics. In the present situation, what else can unite all Slavic nations, if not the common cultural past in chorus singing? It adds additional popularity concerning this topic.

In our opinion, it is very necessary to invent proper implementation on choral singing.

Aesthetics and poetics of choral singing are very important factors for those people who want to study chorus singing online. It is very interesting factor about the mixture that can be presented both online and offline.

Nowadays we should understand that choral singing represents a whole layer of Russian national culture. It is worth noting that before many musical instruments were invented, choral singing was the only way of entertainment in the evenings. Each village had its own chorus and its own fans of this kind of art.

Now we are entering a new era of modern technology. This clearly raises the question whether we should pay attention to choral singing like we did before or if we should turn to other forms of art. Also, is it possible to learn choral singing on the Internet, and if it is possible, how exactly it can be achieved?

There are many people who say in favor or against teaching chorus singing online. Some or the scientists claim that it is quite possible with the help of modern technologies, other say that it is really impossible in practice and that it is better to teach such kind of discipline face-to-face than by using OBE.

Main part

Thanks to the Internet it is an obvious fact that you can teach your pupil from every part of the world. Some scientists argue that it is quite possible [Jia Yuchen, 2017; Silvestru et al., 2018; Sneddon et al., 2018] others say that flipped classroom can be very interesting but dystopian idea [Yuh-Tyng, 2019; Zhang, 2018]. Some scientists had neutral position concerning this issue, claiming that it is quite possible [Zhang, Feng, 2018; Zhang, 2002].

As you can see, there are huge debates concerning this position. In our investigation we will combine some methods, that will be mentioned below.

As you can see, a hot discussion concerning this topic takes place nowadays. We can't but mention that fact that Zhang L. stressed that "With the development of the Internet, various online course platforms provide a friendly environment for online course construction" [Jia Yuchen, 2017]. However, nobody of scientists mentioned that fact how exactly it can be achieved, taking into consideration the fact that everybody understands something unique if we speak about the development of modern technologies.

Can MOOC+SPOC online and offline hybrid teaching be a perform solution towards this controversial point?

The article presents a brief historical background on the development of choral singing, reveals the main methodological principles, identifies problem areas in this direction, and substantiates the prospects.

The materials of the article are of practical value for every teacher in the modern world, because every teacher does his or her best to achieve a proper result.

Materials and methods. Speaking about materials and methods of our investigation, the main methods of it are comparative methods, historical method and of course, inductive and deductive methods. We think that with the help of this methodology we can achieve better results in the main part of our investigation.

However, the main method in this study is of this problem is a systematic approach that allows us to comprehensively consider the problem of teaching methods of choral singing. Indeed, all should be considered as the whole system, if we speak about this methodology. Without taking it as a whole system, all further investigations concerning this topic will have no practical sense.

If we consider this exact goal, for the first time we should dive into the history of the investigation. It is obvious that without proper historical background our investigation will have no sense at all. Moreover, the history of the topic, which is under consideration, is very vivid because there are plenty of debates concerning the original methodology of teaching.

With the help of comparative method, we are able to:

1) compare different views concerning this problem. It includes both the views of the scientists, who are in favor of online teaching, including innovation of MOOC+SPOC online, based on OBE concept. We can get a clear answer of this innovation and how exactly it is going to help in the future;

2) Having compared all these views, we can get our own conclusion with the help of the methodology, mentioned above

The additional methods are quantitative and qualitative methods, induction, deduction, analysis, synthesis, systematization, which can be very useful for every scientific investigation. Special attention in this investigation is concentrated on inductive and deductive method, which can help us to get a logical result from this investigation is to implement these results in the future practice.

The study of aesthetics and poetics of choral singing, in our opinion, require using these methods as the main ones.

Results

The topic which is under analysis is very actual nowadays.

It was clearly found out that the relevance of the study is in the fact that currently insufficient attention is paid to the vocal education of students of musical and pedagogical universities, which have their own features associated with the need to achieve the universality of the future teacher-musician, which consists in mastering musical knowledge and skills (playing a musical instrument, singing solo, in an ensemble and in a choir, conducting, directing a choir and an ensemble, musical theory and music history, etc.), acquiring advanced pedagogical competencies, developing artistic and improvisational abilities.

In online choral teaching there are a lot of interdisciplinary connections with other subjects. One must be specialist in physiology to study well online and offline connections.

OBE concept is very important nowadays, as it is claimed by many scientists. However, it doesn't have an ability to make a full substitution of alive meetings. It doesn't have power to replace the teaching of different interdisciplinary connections that have big influence on offline meetings.

However, there are a lot of people who believe that online meetings can fully substitute offline meetings.

In this regard, this article is aimed at identifying or disclosing the features and methods of teaching choral singing at a university or online and how exactly it can be combined.

The results can be demonstrated in the following table:

A training program for transport specialists could be implemented as follows (fig. 1).

Name of subjects	total including	total including	
	hours lectures practical exercises	hours lectures practical exercises	hours lectures practical exercises
Music theory	3	3	-
Music practice	4	3	1
Choral singing theory	10	6	4
Choral singing practice	17	9	8
Final exam	2	-	-
Total	**36**	**21**	**13**

Figure 1 - A training program for transport specialists could be as follows

As you can see, it better nowadays to unite both online as well as offline education. This unification may lead to the fact that education will be really good and proper for modern time.

Consequently, the best thing is to combine online methods of teaching choral singing with classical ones. Important parts off subject can be taught offline while less important have a potential to be taught offline.

In the next chart to you can clearly see the increasing amount of people who prefer online course to the real ones in 2022 (taken from the open sources):
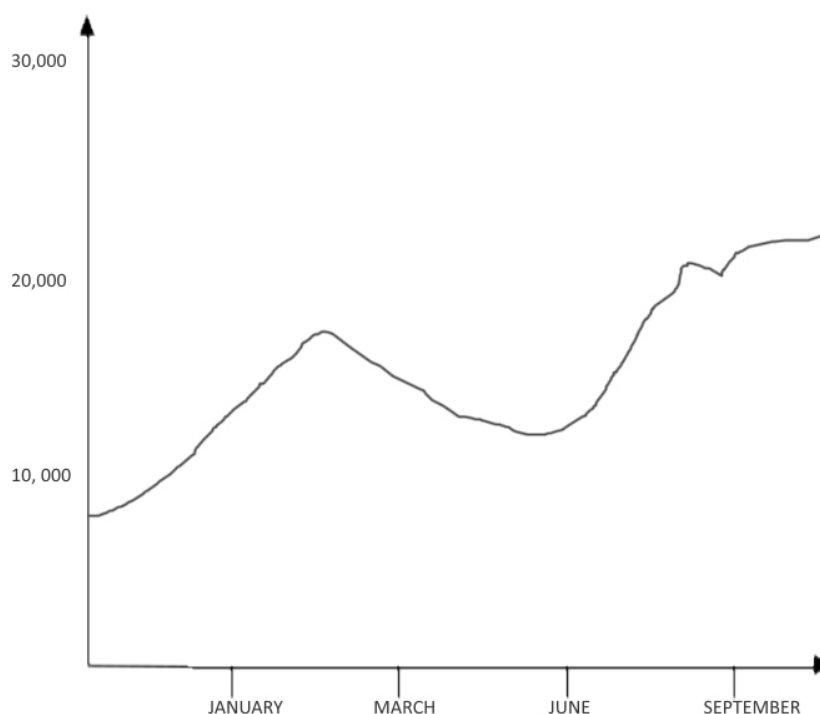

Chart 1.2. The amount of people who prefer online education in 2022

As you can see, the number of those wishing to receive, so to speak, a virtual education, in 2022 has generally increased. However, in the middle of the year we could see a certain drop in the data of this graph.

We can only assume that many people (this is taken from both the theoretical part, and the practical data) prefer to learn using the old methods, so they like a live education, rather than a virtual one. In fact, we can understand these people, because virtual education can have a number of drawbacks, such as lack of access to the network and different cultural layers between the student and the teacher, which we would like to pay very close attention to.

The point is that when you study in your city or in your region, there is no cultural difference between you and your teacher. You come from the same city, you have walked down the same streets since childhood, even if it were different times, you have approximately the same mentality. It is completely different when you meet a teacher from another city or another region. Between you and our teacher will already be a difference in cultural layers. This can have a very negative impact on the learning process.

Can OBE compensate this difference? Is MOOC+SPOC online and offline hybrid teaching are able to substitute real communication?

Moreover, plenty of additional questions arise. What exact part of the program, mentioned above, can applied online? Only theoretical subjects can be somehow presented online, not more. If we think about practical subjects, they, unfortunately, can't be presented online. It would be just a waste of time both for students as well as for teachers.

However, we can clearly see that the number of people who prefer online lessons for real ones, drastically increases. The reasons for this increasing is COVID-19. However, after COVID-19 we can observe the falling of number of people, who prefer online classes.

Many scientists claimed that nowadays there are very big amount of drawbacks concerning online choral teaching. The main thing lays in the fact that you have actually to see your pupil to get a proper educational effect. You can't get everything what you want if you don't meet in real life and do the studying process only online. Other people claim that these are no any difference between real communication and virtual communication, because in both cases you do hear the voice of the teacher and the voice of the pupil and it is actually the main thing for educational process.

We think that using OBE must be very limited because nowadays nothing can substitute real face-to-face communication.

On the next you can see the number (quantity) of people, who found themselves comfortable in 2022 moving from one part of the country to another and from one country to another (taken from the open sources).

As you can see, not everybody finds himself happy in the desired place. It is closely connected with the topic of investigation, because if you communicate with the teacher from another town, it doesn't mean that you will find good point of contact and that the communication will be successful.

Discussion

Many people argue that nowadays it is quite impossible to imagine our life without different smartphones, social networks, different mobile applications. Consequently, everything can be made via the Internet, including chorus singing. Other people are strongly against strict implementation of the modern technologies, telling that they are damaging our brain health.

Some scientists claim that nowadays it is just a waste of time to perform such kind of research [ibid;

Silvestru et al., 2018]. other people claim that nowadays the research significance can be determined as very high [Freitas, 2018; Goldberg, 2018; Jiang, 2017]. As you can see, nowadays there are no clear agreement among scientists concerning the necessity or uselessness of this research.
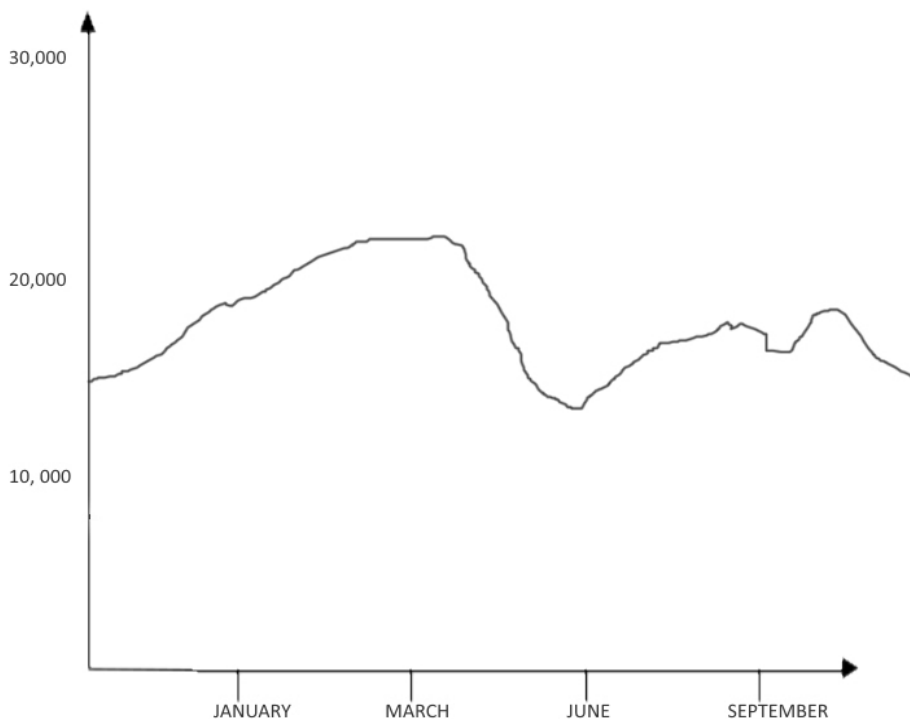

Chart 1.3. Number (quantity) of people, who found themselves comfortable in 2022, moving from one part of the country to another and from one country to another (taken from the open sources).

There are a lot of other contradictions concerning the peculiarities of the research topic and the nuances of it.

As it is known, a choir is a complex, even specific "musical instrument" that requires the simultaneous sounding of a large group of people at once. Under the current conditions, emphasizing the words "simultaneous sounding", as well as based on the new experience of connecting the sound of performers located at a distance, transmitted even with the help of modern instant messengers, this is impossible to do.

MOOC+SPOC online and offline hybrid teaching can have a drastic impact concerning the issue.

While choirs are in forced quarantine, one of the interesting forms of work can be individual work with choir members. Each choir has lead singers and those who are unsure of the part, who need vocal support. Usually, during the traditional rehearsal, the attention of the choirmaster is given to everyone. If we focus on working with the "lagging behind", then we can develop the performance confidence of the latter and significantly improve the quality of the overall sound of the choir. In order to maintain the interest of such classes, it is necessary to include in the work new works that will be included in the repertoire of the choir.

In this context it is very actual to take into consideration that OBE can't fully substitute the real, face-to-face communication.

Many people don't support OBE because they prefer face-to-face communication, including choral

teaching as the aspect of this communication.

Many scientists claim that you can easily combine different styles of teaching choral singing [Freitas, 2018; Garcia, 2019; Goldberg, 2018; Jiang, 2017; Vaysse, 2018] and we completely agree with the majority of scientists. It can be achieved in the following ways:

– Discussing of the actual topics with the students by face-to-face communication. Their understanding of this situation is going definitely to be better after that;

– Meeting online if the topic is not so important.

Consequently, if a choir is so complicated, it is practically impossible to achieve good quality of performing different part of complicated choral parties if you study them only thought the Internet. Consequently, you should have some kind of mixture, meaning that you can take some parts of course via the Internet but you should definitely pass exams face-to-face or perform some other necessary parts of your education face-to-face.

In this work, the student gradually begins to discover his performing inclinations, his manner of performance. If we draw parallels between choir parties and medicine, it was claimed that "The results show that PBL students generally ask more efficient questions and use fewer questions to complete the task" [He, 2017]. The same thing can be seen while studying choir singing, mathematics, linguistics or any other piece of science using only OBE methodology.

The debate about the pros and cons of virtual education has been going on since the invention of the Internet. However, we regretfully have to state that at present these debates do not lead to a mutually beneficial result. In fact, for many scholars, it is the process of the dispute itself is much more important, rather than getting some practical benefit out of it.

At the same time, in our opinion, we must discard the collectivist approach when it comes to online learning. The future of the whole educational process lays exclusively in an individualistic approach. This is especially true when it comes to educational processes. Moreover, when it comes to such an important aspect as teaching choral singing, we cannot talk about the possibility of completely replacing real-world learning with online learning, being totally sure that we are not wrong.

MOOC+SPOC online and offline hybrid teaching is the best factor for implementing individualistic approach.

An individualistic approach is very important in today's learning process. We believe that there are no bad students, there are only bad teachers who have not sufficiently explained the most important nuances of this or that material. For choral singing the individualistic approach is even more important than for any other science. The explanation for this thesis is quite simple: students have a completely individual voice, which simply cannot be fitted into certain frameworks. This is where an individualistic approach to each student is important, which cannot be fully implemented during online learning. Of course, more often than not, online lessons are conducted on an individual basis. It is very rare thing that such classes are held in some kind of groups. However, online it is impossible to fully understand the mood of the student, his attitude towards the subject, his plans regarding the material being studied, and so on. This thesis once again confirms the fact that the online lessons for any subject, especially for choral singing, can never serve as a full replacement for the lessons in the real world

It's important to understand that teaching choral singing involves an infinite number of nuances that can't be explained online. To confirm our thesis we can give a simple example.

Suppose that a student needs to learn a musical scale and sing all the notes that make up this scale. Of course, learning a musical scale can be done online, and the first attempts at singing can also be done online. You can even take an exam or a specific test with a teacher online. But the nuances cannot be explained over the Internet. You can draw parallels with learning to play the guitar. A student can

learn all the notes, how to theoretically place the fingers correctly, but the nuances of clamping a certain string on a certain fret cannot be understood online, as the teacher in such classes most often corrects the student's fingers, placing them in the right position.

Another parallel example would be the example of knowing the stars. It is possible to explain very intelligently on the Internet about the location of stars, about which star is closer or farther from the Earth, about the size of the stars and so on. But it seems to us that it would be much better if the student looked at these stars by going out at night and watched them in real life. It is in this case that the theoretical material, which is of course very important, will get its practical confirmation, and the pupil will better remember the different constellations, the distance to the stars will be clearly demonstrated and, in general, all the theoretical postulates will find their practical confirmation. Many scientists say that pure theory without practice is dead, since every theoretical aspect needs either a practical confirmation or a practical refutation, which is not uncommon in today's scientific world.

We have given this example to show how lessons in the real world compare favorably to lessons online using only online teaching.

Consequently, online lessons can not a substitution to face-face lessons and can serve only as additional material. We can use MOOC+SPOC online and offline hybrid teaching.

Conclusion

It was found out during our investigation that with distance learning, the effectiveness of the developed educational materials becomes a decisive factor in the success of the implementation of the educational program in a distance form. The development of educational materials is understood as: the use and adjustment of their own developments, the digitization of teaching aids, the development of tests, quizzes, presentations, tests, the selection and processing of materials posted on various resources, in information databases, as well as materials open for free access on websites publishing houses, libraries and other cultural institutions.

MOOC+SPOC online and offline hybrid teaching can be the best neutral solution concerning this problem.

Educational materials:
− are developed taking into account the lesson submission. The level of the student can be found clearly online;
− are developed taking into account the use of interactive technologies. It can be done online only partly;
− possess qualities that stimulate independent activity of students. Can be only partly done online;
− allow for operational control and evaluation of the performance of tasks. Can't be done online;
− include visual materials (notes). Can be done online;
− are developed taking into account available programs and platforms, ways of transferring educational material from the teacher and the results of independent work from the student. Can be done online only partly.

As you can see, it clearly shows us that nowadays online teaching can't fully substitute face-to-face communication.

We believe that nowadays it is tremendously important to combine different methods of teaching to achieve proper result in the whole educational process.

The complex, created by the teacher independently, is compiled on the basis of his own developments, various elements of teaching aids, anthologies, multimedia programs, audio and video

materials, can successfully replace training with the personal presence of all participants in the class.

The collective work of choirmasters, accompanists and management will make it possible to carry out the process of transition to distance learning in the shortest possible time. And the developed complexes will be successfully applied in the future, will become relevant and useful material for other teachers.

However, no any nuance can be performed online.

In accordance with the legislation of the Russian Federation, the working time of a teacher includes: conducting training sessions (normalized part of working time), other pedagogical work (non-standardized part of working time).

During the period of distance learning, the workload set for the teacher can be distributed as follows: individual lessons, conference lessons, webinar lessons, organization and support of students' independent work, consultations (interviews) with students, monitoring and evaluation.

In our opinion, MOOC+SPOC online and offline hybrid teaching can be found out as the best solution towards this complicated problem.

"Other pedagogical work" when organizing distance learning includes:

1) Carrying out work on adjusting calendar, calendar-thematic plans, on making changes to the work program of the subject. It is very important nowadays, because many scientists claim that individual approach in pedagogical science has a big future because collective approach no longer satisfies both teachers as well as students. The individual approach nowadays is very necessary in the practice of every sphere, including choral singing. Here we see a controversial situation. On the one hand, the OBE methodology will do well if we speak about individual approach. On the other hand, it is the right thing if we speak about some nuances and peculiarities of the choral singing. How the nuances of music, different peculiarities of vocals can be explained online? We do believe that only face-to-face communication will be practical in this situation.

2) Development of lessons (lesson planning, creation of a detailed lesson plan). However, at the present time it is really unbelievable fact how exactly common approach to lesson is possible for online teaching of choral singing. We think that in this case the Internet can be only a helper, but will never substitute real communication with teacher.

3) Development and design of educational material for independent work of students, including the creation of video lessons, phonograms, analysis and selection of electronic resources. We think that this approach towards teaching can be really applicable. Via email some necessary materials can be sent for the students and they can easily practice choral singing at home.

4) Prompt informing students and parents about the peculiarities of the organization of the educational process. Nowadays it is really applicable for online commutation.

5) Spreading of necessary educational materials; organization of independent work of students.

6) Control and evaluation of independent work of students, consultations for parents, methodological support for useful leisure of students.

All in all, we think some points, mentioned above are really applicable for online communication but some of the problems can be solved only with the help of face-to-face meetings. Thus we believe that online communication between the teacher and the student can only partly substitute real communication, and be on;y a helper for face-to-face communication.

Maybe in the future thing will drastically change, but nowadays we have what we have concerning online communication.

References

1. Freitas A. (2018) Understanding the faculty perspectives influencing their innovative practices in MOOCs/SPOCs: A case study. *International Journal of Educational Technology in Higher*, 15, 5.
2. Garcia A.L. (2019) ICT skills gap in Spain: Before and after a decade of harmonizing the European Higher Education Area. *Computer Applications in Engineering Education*, 27, 4, pp. 934-942.
3. Goldberg J.R. (2018) A student-centered learning approach to design for manufacturability: Meeting the needs of an often-forgotten customer. *The International Journal of Engineering Education,* 34 (2B), pp. 599-608.
4. He Y. et al. (2017) A comparison between the effectiveness of PBL and LBL. *The International Journal of Engineering Education*, 1-11.
5. Jiang H. (2017) *Inquiry into teaching mode combined with engineering case under background of engineering education accreditation.*
6. Jia Yuchen (2017) Research and application of online SPOC teaching mode in analog circuit course Yuchen Jia and Limei Zhang. *The International Journal of Engineering Education*, 18, 10.
7. Silvestru C.I. et al. (2018) ISCED classification influence on e-learning education systems. *Informatica Economică*, 22 (4), pp. 80-88.
8. Sneddon J. et al. (2018) Development and impact of a massive open online course (MOOC) for antimicrobial stewardship. *Journal of Antimicrobial Chemotherapy,* 73, 4, pp. 1091-1097.
9. Vaysse C. et al. (2018) The impact of a small private online course as a new approach to teaching oncology: Development and evaluation. *JMIR Medical Education*, 4 (1), e6.
10. Yuh-Tyn C. et al. (2019) The relationships among gender, cognitive styles, learning strategies, and learning performance in the flipped classroom. *International Journal of Human-Computer Interaction*, 35, 4-5, pp. 395-403.
11. Zhang E. et al. (2018) SPOC-based flipped classroom of College English: Construction of an effective learning model. *International Journal of Emerging Technologies in Learning*, 13 (01), 37.
12. Zhang L.F. (2002) Thinking styles and cognitive development. *Citation Journal of Genetic Psychology*, 163, 2, pp. 179-195.
13. Zhang L.F. (2002) Thinking Styles: their relationships with modes of thinking and academic performance. *Educational Psychology*, 22 (3), pp. 331-348.
14. Zhang M. et al. (2018) Prevalence of psychological distress and the effects of resilience and perceived social support among Chinese college students: Does gender make a difference? *Psychiatry Res*, 267, pp. 409-413.
15. Zhang S. et al. (2018) Effects of problem-based learning in Chinese radiology education: A systematic review and meta-analysis. *Medicine (Baltimore),* 97 (9), e0069.

Инновации в гибридном режиме онлайн и офлайн-обучения MOOC+SPOC, основанном на концепции OBE – на примере обучения хоровому пению

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Аннотация

Существует множество исследований, касающихся влияния гибридного обучения на реальный образовательный процесс. В эпоху COVID-19 эта тема приобрела дополнительное влияние на простых людей. В ходе данного исследования мы показываем, что гибридное обучение имеет как недостатки, так и преимущества. Цель исследования: 1) описать современные подходы к гибридному онлайн- и офлайн-обучению MOOC+SPOC. В качестве примера возьмем обучение хоровому пени., потому что это самое сложное, на наш взгляд, для преподавания онлайн. 2) Выявить некоторые новые аспекты этого явления, которые ранее не упоминались в исследованиях. Результаты: 1. В настоящее время очень актуально онлайн-обучение, но оно не может быть применено к хоровому пению, потому что его нужно преподавать офлайн, видя своего ученика в реальной жизни. Онлайн-инструменты могут служить лишь дополнительными инструментами для очных встреч. Например, теорию можно преподавать онлайн путем самообразования. 2. Не каждую сферу образования можно осуществить с помощью онлайн-обучения.

Библиография

1. Freitas A. Understanding the faculty perspectives influencing their innovative practices in MOOCs/SPOCs: A case study // International Journal of Educational Technology in Higher. 2018. 15. 5.
2. Garcia A.L. ICT skills gap in Spain: Before and after a decade of harmonizing the European Higher Education Area // Computer Applications in Engineering Education. 2019. Vol. 27. Is. 4. P. 934-942.
3. Goldberg J.R. A student-centered learning approach to design for manufacturability: Meeting the needs of an often-forgotten customer // The International Journal of Engineering Education. 2018. 34 (2B). P. 599-608.
4. He Y. et al. A comparison between the effectiveness of PBL and LBL // The International Journal of Engineering Education. 2017. 1-11.
5. Jiang H. Inquiry into teaching mode combined with engineering case under background of engineering education accreditation. 2017.
6. Jia Yuchen. Research and application of online SPOC teaching mode in analog circuit course Yuchen Jia and Limei Zhang // The International Journal of Engineering Education. 2017. 18. 10.
7. Silvestru C.I. et al. ISCED classification influence on e-learning education systems // Informatica Economică. 2018. 22 (4). P. 80-88.
8. Sneddon J. et al. Development and impact of a massive open online course (MOOC) for antimicrobial stewardship // Journal of Antimicrobial Chemotherapy. 2018. Vol. 73. Is. 4. P. 1091-1097.
9. Vaysse C. et al. The impact of a small private online course as a new approach to teaching oncology: Development and evaluation // JMIR Medical Education. 2018. 4 (1). e6.
10. Yuh-Tyn C. et al. The relationships among gender, cognitive styles, learning strategies, and learning performance in the flipped classroom // International Journal of Human-Computer Interaction. 2019. 35. 4-5. P. 395-403.
11. Zhang E. et al. SPOC-based flipped classroom of College English: Construction of an effective learning model // International Journal of Emerging Technologies in Learning. 2018. 13 (01). 37.
12. Zhang L.F. Thinking styles and cognitive development // Citation Journal of Genetic Psychology. 2002. Vol. 163. 2. P. 179-195.
13. Zhang L.F. Thinking Styles: their relationships with modes of thinking and academic performance // Educational Psychology. 2002. 22 (3). P. 331-348.

14. Zhang M. et al. Prevalence of psychological distress and the effects of resilience and perceived social support among Chinese college students: Does gender make a difference? // Psychiatry Res. 2018. 267. P. 409-413.

15. Zhang S. et al. Effects of problem-based learning in Chinese radiology education: A systematic review and meta-analysis // Medicine (Baltimore). 2018. 97 (9). e0069.