Artículo de investigación

Studying the Effectiveness of Teacher Training in Organization of Open Education

Исследование эффективности подготовки преподавателей к организации открытого образования

Investigación de la eficiencia de la preparación de los profesores para la organización de la formación abierta

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Abstract

The modern concept of open education modifies the traditional learning format through advanced information and communications technology. This fact imposes special requirements for all participants in the learning process and makes it necessary to reconsider the tasks and functions of students and teachers. This is relevant, therefore, to find a way of making a gradual transition to the model of open education. Based on an experiment with introductory training, the authors perform an empirical assessment of teachers' preparedness to organize open education and use open educational resources (OER). The effectiveness of the introductory training of teachers was checked by means of interviewing and testing respondents. The research results showed that there were significant changes in the training criteria: according to the motivational and value-based criterion, virtually all teachers displayed a positive shift in their attitude to organization of open education; in terms of the cognitive

Аннотация

Современная концепция открытого образования модифицирует традиционный формат обучения с помощью передовых информационно-коммуникационных технологий. Это обстоятельство создает особые требования ко всем участникам образовательного процесса, принципиально пересматривается задачи и функции как студента, так и преподавателя. Поэтому актуальным становится поиск подхода постепенного перехода к модели открытого образования. Эмпирическая оценка готовности преподавателей к организации открытого образования и использованию открытых образовательных ресурсов (OER) проводилась нами на основе эксперимента по дополнительному обучению. Эффективность предварительной подготовки преподавателей проверялась путем опроса и тестирования респондентов. Полученные нами результаты указывают на то, что имеются значительные

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criterion, the teachers acquired thorough knowledge of open education tools; according to the operational criterion, the teachers acquired the necessary skills in developing and introducing OER. In the process of observation, we recorded a rise in the number of teachers with a sufficient (by 60.5% compared with the verification stage) and high (by 16.6%) level of preparedness. The introductory training, therefore, is a principal component in the stable system of open education.

***Key Words*:** Open education, professional competencies, student, teacher, higher education, information and communications technology.

изменения по уровням сформированности критериев подготовки: по мотивационно-ценностному критерию почти у всех преподавателей в положительную сторону изменилось отношение к проблеме организации открытого образования; в соответствии с когнитивным показателем у преподавателей сформировались устойчивые знания инструментария; по операционному показателю готовности сформированы необходимые умения и навыки разработки OER и их внедрения. В процессе наблюдения нами зафиксирован рост количества преподавателей с достаточным (на 60,5 % по сравнению с констатирующим этапом) и высоким (на 16,6 %) уровнем общей готовности. Это привело к выводу, что предварительная методическая подготовка является необходимой составляющей построения устойчивой системы открытого образования.

Ключевые слова: открытое образование, профессиональные компетенции, студент, преподаватель, высшее образование, информационно-коммуникационные технологии.

Resumen

La concepción moderna de la formación abierta modifica el formato tradicional de la enseñanza por medio de las tecnologías avanzadas informativas de comunicación. Esta circunstancia crea las exigencias especiales a todos los participantes del proceso de instrucción, se revisan en principio las tareas y funciones tanto del estudiante, como del profesor. Por eso se hace actual la búsqueda del acceso del tránsito gradual al modelo de la formación abierta. La apreciación empírica de la preparación de los profesores para la organización de la formación abierta y para el uso de los recursos abiertos de instrucción (OER) se realizó por nosotros a base del experimento sobre la enseñanza adicional. La eficiencia de la preparación preliminar de los profesores fue comprobada por medio de la encuesta y del test de los entrevistados. Los resultados obtenidos por nosotros indican que hay unos cambios considerables por los niveles de la formación de los criterios de la preparación: según el criterio de motivación de valor en casi todos los profesores se ha cambiado positivamente la actitud hacia el problema de la organización de la formación abierta; en concordancia con el índice cognitivo en los profesores se han formado los conocimientos estables del instrumental; por el indicador operacional de la preparación han sido formadas las habilidades necesarias y las prácticas de la elaboración de los OER y su introducción. Durante la observación, por nosotros ha sido fijado el crecimiento de la cantidad de los profesores con suficiente (en el 60.5% en comparación con la etapa que se constata) y alto (en el 16.6%) nivel de la preparación general. Esto ha llevado a la conclusión de que la preparación preliminar metódica es componente necesario de la construcción del sistema estable de la formación abierta.

Palabras clave: Formación abierta, competencias profesionales, estudiante, profesor, enseñanza superior, tecnologías informativas de comunicación.

Introduction

Education plays a key part in the functioning and progress of society (Manuylov, Galkin, & Fedotov, 2004; Aleksejeva, 2016; Sam, 2018). Currently, education is undergoing a period of modernization characterized by the following features: improvement in the methods and

organizational forms of teaching (Li & Tsai, 2013; Alkhatib, 2018); the implementation of the model of the continuing education system (Mansour et al., 2014; Andersson & Köpsén, 2015); creation of a set of pedagogical tools focused on the development of intellectual potential (Kurylev, 2008; Kong et al., 2015); formation of a certain level of a teacher's competence that determines their preparedness to carry out professional activities in the information environment (Sloan, 2015; Carlisle & Weaver, 2018). The outcome of the transformation was a brand-new concept, whose main priority was the accumulation of fundamental professional and personal competencies acquired in the process of independent creative training.

Consistent trends such as globalization and digitalization modify the traditional learning format through modern communication technology proclaiming the principle of open information networks. This requires the pedagogical theory and practice to clearly identify the mechanisms for working with a human as a subject of the learning process. When combined with the highlighted trends, it changes the status of teachers and revises their functions. In the learning sphere, it strengthens the role of searching, selecting, assessing, organizing, presenting and transmitting knowledge, as well as planning and organizing individual, groupwork, collective and network activities (Cooley, Burns, & Cumming, 2015; Wang & Murota, 2016). The role of educational institutions and students is also reassessed (Čirjevskis, 2015; Alcalde & Nagel, 2016).

The practice of open education, becoming more widespread, creates a problem of institutionalization of self-directed learning. This issue is widely debated in the scientific community today. To deliver knowledge to students, it is necessary to develop special training aids focused on self-directed learning (Ozdemir & Hendricks, 2017). Students should be individualized in an open educational space, which should allow them to realize their potential to the greatest possible extent (Nash, 2014). At that, the effectiveness of the learning process is dependent on the form of interaction between the student and the teacher. In a destructive interaction, it is overlooked that the assimilation of information is associated with its comprehension. However, an objective assessment of the understanding and correct interpretation of the material in the system of open education is limited by the formal approach of recording the existing knowledge. It is generally believed that ensuring high quality of distant education is impossible without intrinsic motivation, cognitive activity and conscientiousness of students (Muskin, 2015).

These and many other reasons make it increasingly important to train teachers to introduce the system of open education and use open educational resources (OER) in their teaching practice. Due to the fact that openness as a professional quality of a teacher is yet poorly studied and there are no clear guidelines for this process, we aim to empirically assess the effectiveness of introductory training. According to the experiment, teachers were supposed to work in an open distant educational space, where their activities were associated with not only the development and variable transfer of new technologies, but also with the integration of the acquired knowledge into their teaching practice. Hence, during the training of teachers, it was necessary to model various aspects of their professional activities and evaluate the effectiveness of this approach.

Literature review

The formation of the open space of continuing education is a crucial task for society. Open education in a peculiar way breaks the monopoly on knowledge and offers the opportunity to freely exchange information resources (Tan, Ho, & Pang, 2016). In this situation, an individual gets the opportunity to independently choose the goals, content, method, place and time of learning, whereas educational institutions are able to provide educational services in different ways with regard to the needs of society and the job market. Cooperative (partner) co-management of education is being created on the basis of the single information-network environment (Dubauskas & Balius, 2015).

While exploring the experience of practical implementation of this idea, Rakhkoshkin (2005) shows that it is carried out at three basic levels: openness of the education system, openness of the educational institution, and openness of the educational process.

A number of authors (Andreev, 1998; Andreev & Soldatkin, 2002) discuss the history of the systems of open education and distant learning using the global experience. The system of open education is known to be based on large-scale communication technologies and is aimed at student-centered learning (Ilomäki & Lakkala, 2018). This is why it is the most effective approach, on the one hand, associated with

synergetic models and, on the other hand, capable of becoming the basis for competencies formation. Moiseev (2002) argues that open education is a new historical stage in the development of education. Its main objective is to inculcate a particular mindset into students that is further added with necessary professional knowledge (Volchik & Maslyukova, 2017). According to Pevzner, Buketov and Zaychenko (2000), education as an open system is characterized by incompleteness and the ability to interact with the environment. The top priority of open education is the free development of personality, in which the central part is attributed to the joint creative comprehension of the world (Kalimullin & Utemov, 2017).

It is worth noting that the principle of openness of education reflects the possibility of translating the ontological approach into activity-based one. This methodological grounding of openness allows creating a model for cognition of the reality that is different from the dominating traditional one. According to the model, a student has to be aware of his/her abilities so as to implement them. It is impossible, therefore, to plan and realize open education without psychological-pedagogical studies (Potapova & Tsilitskiy, 2016).

The process of changing the role and significance of the educational process components transforms the nature of pedagogical relations, which leads to a fundamental revision of the objectives and functions of a teacher. In an open education environment, the requirements for a teacher are the following (Holmberg, 1989): focus on innovative training; holding an interpersonal dialog; competence in the field of self-directed learning; ability to promote creative activity, etc. Oftentimes, some of the requirements are similar to the main peculiarities of open education organization with a focus on the self-directed cognitive activity of teachers, change in the ways of interaction between participants, and the flexibility of organizational forms of training (Guri-Rozenblit, 1993). Teacher should be qualified to guide students on their individual learning paths (Goncharova & Shevchenko, 2012; Uvarova & Maksimchenko, 2012), assimilate a variety of forms of social network interaction along with them, and participate in projects and research studies (Goodnough, 2010; Macheridis, 2017).

When performing pedagogical activity in a new environment, teachers encounter a range of challenges caused by the use of information and communications technology. They are forced to delegate part of their functions to leaders and participants of study groups, to master such activities as tutoring, facilitation, various types of assistance and support, distance advising, etc. At that, IT competency and expertise are an indispensable prerequisite for their professionalism (Kolesnikova, 2009).

The literature review allowed us to assume that the system of open education is generally presented in the form of a certain technological sequence, where a special role is assigned to the student and the teacher. At the same time, the modern educational technologies set out specific requirements for teachers' competence. Generalization of these requirements in the form of a functional model will facilitate the understanding of teachers' preparedness to use innovative methods and techniques in their practice.

Materials and Methods

To substantiate teachers' preparedness to adopt the system of open education, its functional model was developed (Batkovskiy et al., 2015). It allowed identifying the similarities and differences with the classical model of learning. The theoretical foundations of the functioning of the open education system were established on andragogical, system-based, competency-based and technological methodological approaches.

To evaluate teachers' preparedness to organize open education, multi-staged structured interview and testing were held. Teachers' preparedness to adopt open education and introduce open educational resources into the learning process was analyzed according to four aspects: 1) organizational – the ability to organize open education; 2) informational – the ability to create distance courses in the system of open education; 3) communicative – the ability to communicate in the system of open education; 4) developing – the ability to encourage cognitive activity of teachers in the system of open education.

At the beginning of the experiment, testing was carried out using an adapted method (Chuvikov, 2017; Balashova & Alekseev, 2018), which allowed illustrating changes in the preparedness to use OER by a number of criteria: (1) motivational and value-based; (2) cognitive; (3) operational. The essence of the experiment is to justify the effectiveness of the introductory theoretical-methodological training for teachers to organize open education and use open educational resources.

The effectiveness of the training in terms of introducing open education in order to develop the professional-pedagogical competence of teachers was checked using the comparison method that implied comparing the results obtained at the verification and formation stages. The total number of respondents remained unchanged. At that, similar methods for monitoring the development of professional-pedagogical competence of teachers were applied at both the verification and formation stages.

The anonymous survey of respondents was held at the Mittetulundusühing Institute for Monitoring Education Quality Quality (Estonia) among teachers who agreed to take a distance learning course on working in the electronic educational environment. A total of 294 respondents took part in the survey. The composition of the control groups was determined by random sampling.
The overall level of preparedness of teachers to organize open education was calculated by formula

$$\sum = \frac{(a_1 + a_2 + a_3)}{n}, \quad (1)$$

where Σ is the initial level of preparedness; *a* is the number of participants at the corresponding level of the preparedness criterion (motivational and value-based, cognitive, and operational); *n* is the number of preparedness criteria.

The effectiveness of teacher training was calculated using the coefficient

$$K = \frac{R_{after}}{R_{before}}, \quad (2)$$

where R_{after} is the total value of the average, sufficient and high indicators of teachers' preparedness for the relevant criterion after the experiment, in %; R_{before} is the total value of the average, sufficient and high indicators of teachers' preparedness for the relevant criterion before the experiment, in %. The teacher training is effective if $K > 1$.

Statistical analysis of the obtained results was carried out using Microsoft Excel.

Results and Discussion

The results of testing teachers according to the adapted method in terms of motivation to utilize OER in the learning practice showed that 90% of respondents chose a set of the following characteristics: high qualification; successful educating and scientific activity; proper fulfilling of professional functions. About 75% of respondents indicated the acquisition of new knowledge, and 33% of respondents pointed to the readiness to participate in innovation activity, receiving a certificate, complying with the training cycle, and earning respect of colleagues. The following criteria remained unselected: getting a financial bonus; keeping up with colleagues; meeting pedagogical requirements; avoiding administrative penalties; and getting intellectual satisfaction.

The cross-stage comparison of the testing results demonstrated that the number of cognitive motives increased in the majority of teachers: the criterion "to be a highly qualified specialist and receive a certificate" rose by 5%; to perform successful educational practice – by 55%; to conduct scientific activity – by 17%; to make professional activity successful – by 55%. This indicates that the introduction of open education resources in the learning process is highly effective.

The statistical processing of the testing results at various stages of the experiment proved the significant changes in the formation levels of the criteria for teachers' preparedness to organize open education (Table 1).

According to the motivational and value-based criterion, the results of the formation stage showed that only 4.2% of teachers displayed no steady cognitive interest in organizing open education. These teachers did not realize the advantages provided by open education in comparison with the traditional approaches.

Table 1. Changes in teachers' preparedness to organize open education and utilize OER, in %

Criterion	Level	Verification stage	Formation stage
(1) Motivational and value-based	High	4.2	20.8
	Sufficient	6.2	66.7
	Average	27.1	8.3
	Low	62.5	4.2
(2) Cognitive	High	4.2	22.9
	Sufficient	4.1	62.5
	Average	29.2	12.5
	Low	62.5	2.1
(3) Operational	High	4.2	25.0
	Sufficient	6.3	62.5
	Average	31.2	10.4
	Low	58.3	2.1

The changes in the development of the motivational and value-based criterion for teachers' preparedness at the formation stage significantly increased if compared with the verification stage. In the process of observation, we recorded a significant rise in the number of teachers with a sufficient (by 60.5% compared with the verification stage) and high (by 16.6%) levels of preparedness. There was an intense interest of teachers in the development of their own distance courses and the use of cloud services. However, when designing an e-learning course, some teachers need help and do not seek to improve it in the future.

Similar to the study of the motivational and value-based criterion, the cognitive criterion exhibited significant changes as well.

The analysis of the data from Table 1 shows that after the specialized training only 2.1% of teachers demonstrated extremely low theoretical knowledge of the fundamentals and principles of organization of open education (in terms of software application, capabilities of cloud technologies, open education hardware). In contrast, there was a significant increase in the number of teachers with sufficient (by 58.4% in comparison with the verification stage) and high (18.7%) levels of preparedness. This signifies that the majority of teachers show in-depth knowledge of hardware devices, software application, and procedures of open education.

Thus, we can assert that the respondents succeed in the practical application and effective adaptation of their knowledge and skills when resolving concrete pedagogical tasks on the basis of general and specific scientific methods of cognition. Increasing the level of teachers' training indicates positive changes in their professional competence and ability to transform the accumulated experience.

After the introduction of OER, teachers not only improved their practical professional skills, but also learned to work in the information and educational environment. The most successful teachers managed to develop e-learning courses, which, in our view, was due to their intrinsic motivation improved.

The study of teachers' preparedness to use open educational resources and the levels of the operational criterion formation showed a rise in the number of respondents with average, sufficient and high level of training. Observations showed that the teachers achieved the best results in compiling individual plans, starting and maintaining personal blogs, and creating electronic portfolios.

According to the motivational and value-based criterion, almost all teachers exhibited a positive shift in their attitude towards organization of open education. According to the cognitive criterion, the teachers gained stable knowledge of open education tools. Proceeding from the theoretical aspects of the role of the cognitive approach, this was the expected outcome (Litau, 2018). According to the operational criterion, the teachers acquired necessary skills in developing and introducing OER. The obtained data emphasize the advantage of the high and sufficient levels of preparedness to organize open education. The generalized results are presented in Table 2.

Table 2. Generalized characteristics of the level of teachers' preparedness to organize open education (final evaluation), in %

Level	Verification stage	Formation stage
High	4.2	22.9
Sufficient	6.2	64.6
Average	29.2	10.4
Low	60.4	2.1

The final stage of the experiment revealed that most teachers achieved the highest level of preparedness to implement open education. This is confirmed by the changes in the effectiveness coefficients. In the course of the research, the following values were obtained:

- By the motivational and value-based criterion, $K = 2{,}55$;
- By the cognitive criterion, $K = 2{,}61$;
- By the operational criterion, $K = 2{,}34$;
- The general level of preparedness $K = 2{,}47$.

Thus, the results indicate that the introductory training of teachers in organizing open education is effective.

Similar monitoring methods were applied to evaluate the teachers' preparedness to use open educational resources among the respondents of the control groups (CG). We identified three control groups of respondents chosen randomly. The sample of all control groups was identical in volume. The generalized analysis is presented in Table 3.

Table 3. Preparedness of the respondents of the control groups to use open educational resources (final evaluation), in %

Criterion	Level	Control group		
		CG 1	CG 2	CG 3
(1) Motivational and value-based	High	2.8	2.6	2.6
	Sufficient	8.5	8.9	8.7
	Average	27.7	29.0	28.2
	Low	61.0	59.5	60.5
(2) Cognitive	High	2.4	2.5	1.9
	Sufficient	7.3	7.4	6.7
	Average	26.2	29.1	27.3
	Low	64.1	61.0	64.1
(3) Operational	High	1.4	2.1	1.8
	Sufficient	7.2	7.6	6.9
	Average	40.2	43.5	40.1
	Low	51.2	46.8	51.2

In the course of the experiment, the control groups displayed minor positive shifts in the teachers' preparedness to use OER and an increase in their psychological-pedagogical competence. These shifts were largely encouraged by several members of the control groups who were especially active in self-directed learning and informal education. In general, the discrepancies between the experimental and control groups can be considered significant.

Conclusions

The study demonstrated that open education resulted in the emergence of new types of professional-pedagogical activity. However, this required the individual need for being a part of the single information network to be cultivated. The open education system is generally presented as a certain technological sequence, where a special role is assigned to the student and the teacher. At the same time, modern technologies make special demands on the content of teacher training.

The current experiment with a subsequent survey and testing the respondents demonstrated the effectiveness of the introductory training of teachers in organizing open education and using open educational resources in their practice. According to the findings, it can be argued that most teachers improved their professional competence. The cross-stage comparison of the testing results demonstrated that the majority of teachers enhanced their cognitive motives. There is a close interest in the development of distance courses, the use of cloud services and other advanced means of communication, storage and dissemination of information. Follow-up observations allowed us to conclude that after the introduction of OER the teachers not only improved their practical skills, but also learned to work in the information and educational environment.

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