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Торайғыров университета

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<https://doi.org/10.48081/MMQJ7392>***Zh. Karatayeva¹, G. Abildinova², Celal Karaca³, N. Ospanova⁴**^{1,2}L. N. Gumilyov Eurasian National University,
Republic of Kazakhstan, Nur-Sultan;³Aksaray University,
Republic of Turkey, Aksaray;⁴Toraighyrov University,
Republic of Kazakhstan, Pavlodar**FORMATION OF A TRAINING COURSE
IN THE DIRECTION OF DIGITAL TECHNOLOGIES
IN RENEWABLE ENERGY SOURCES**

Every year, interest in renewable energy sources (hereinafter referred – RES) is growing at all levels of the global space. This direction has acquired not only an energy and environmental, but also a global political sound, which includes three main factors, such as energy security, reduction of climate change and access to energy to ensure the long-term sustainability of global energy systems. This is stated in the speech of the President of the Republic of Kazakhstan K. K. Tokayev at an expanded meeting of the Government [1]. During the discussion of the «Development of the national electric grid», it was instructed to increase the share of renewable energy sources in the electric power industry by 15 % by 2030, which shows the relevance and necessity of the transition.

This article examines the relevance and interest of a circle of people (faculty, scientists, and students) in the formation of a training course on digital technologies in renewable energy, which will increase the number of interested persons in this industry.

Keywords: Renewable energy sources, digitalization, digital technologies, digital solutions, wind energy.

Introduction

The affordability of low prices and abundant energy with less environmental and ecological risks associated with its production and use is one of the most important factors of environmental growth, as well as the desired improvement in the quality of life of people living in developed and in the developing countries [2; 3].

Digitalization in the energy sector will play an increasingly important role for the development of RES and the continued expansion of the capacities of wind farms and solar-powered plants [4].

Digital technologies can give impetus to the next stage of renewable energy development by integrating RES into energy systems in such a way as to provide a flexible response to electricity demand [3; 4], increasing the efficiency and sustainability of renewable generation [5; 7]. Digitalization and innovative technologies can transform the entire supply chain of «green» electricity – from generation and transportation to distribution and consumption [5]. Industry experts also draw attention to the fact that along with the development of digital technologies, the driver of renewable energy development will also be an increase in the efficiency of solar and wind power plants through the use of new technologies [6].

The above-mentioned relevance reveals the need to train highly qualified personnel who know digital technologies, programming basics and is versed in the direction of renewable energy. It was for this purpose that the authors created a training course within the framework of the American Councils for International Education project for the development of partnership between universities in the USA and Kazakhstan, which was attended by partner universities: L. N. Gumilev Eurasian National University (ENU), Toraighyrov University (ToU), University of Texas Rio Grande Valley (UTRGV). The project is aimed at creating sustainable international cooperation and partnership between higher education institutions of the USA and Kazakhstan in the areas of curriculum development, research and capacity building in the field of renewable energy.

Materials and methods

More and more organizations are striving to move to a digital solution in a digital environment. The direction of renewable energy is no exception and the issue of training specialists is acute in this area. That is, specialists should have not only knowledge and skills in the field of electric power, but also be highly qualified programmers who know and understand the latest conditions for the development of technological solutions (process automation, blockchain, smart networks, artificial intelligence) [8].

According to Walz K. et al. (2016) a huge number of factors influence the formation and implementation of educational programs in the field of renewable energy sources, such as rapid technological progress, new research results, changing regulatory requirements, changing economic policy, ideological debates, and even global environmental and climate [9].

Mayasari T. et al (2019) claims that through education it is possible to be acquainted with alternative energy and influence on knowledge in this area [10].

Caglayan Acikgoz (2011) highlights the lack of the proper education in the field of renewable energy sources and considers environmental and educational factors to be among the important ones [11].

Market changes affect the formation of competencies that require the creation of new related specialties, knowledge and skills of working with digital platforms in eco and energy systems, service models for providing Infrastructure as a Service resources. A new direction in the field of digitalization of renewable energy will lead to a reformation of the labor market, a shortage of specialists with knowledge of the IT industry and energy.

Results and discussion

The formation of a digital transition, preparation for the labor market in the field of industry and IT requires the formation of a high-quality educational program that will include key disciplines in both directions [2; 11]. The construction, formation and organization of the course as a separate optional lesson, or one of the mandatory components of the educational program of related fields is one of the tasks that we have set ourselves [12].

In order to determine the reach of the audience, the interest of listeners, involvement in the process of research in related areas of IT and electric power, a survey was conducted in which 73 participants from various universities took part: ENU, ToU, Karaganda Technical University.

The results of the survey showed that 53.4 % of the course participants are teachers, 31.5 % are bachelor's students, 8.3 % are doctoral students, 4.1 % are specialists and 2.8 % are undergraduates.

When asked about their interest in this training course, 64.4 % answered that it was interesting and 27.4 % answered very interesting, the remaining 6.8 % were neutral and 1.4 % were not interested.

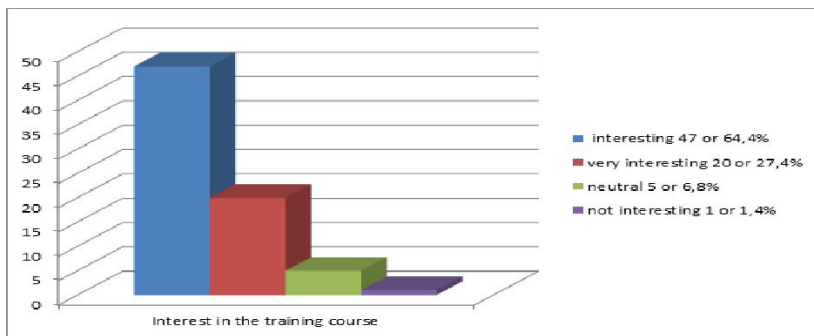


Figure 1 – Interest in the training course

Moreover, for many of those who answered the question about participating earlier as a listener in courses in the direction of renewable energy sources, 80.8 % of listeners answered that no, 17.8 % yes and 1.4 % participated in seminars.

Also, when asked about the appropriateness of introducing this course into the educational curriculum, 89 % answered yes, and the rest of the answers (about 1.4 %, which is 1 answer) were equally divided among all the expected answers.

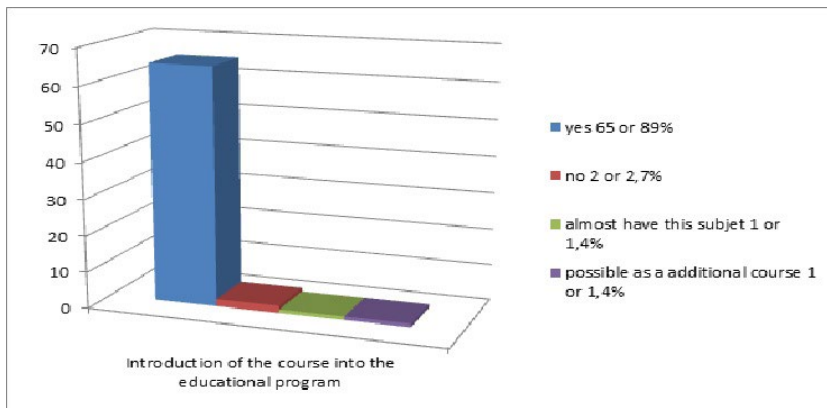


Figure 2 – Introduction of the course into the educational program

Based on the results of both Figures 1. and 2. from this survey, it can be said that the course is interesting, new and possible to recommend for further advancement in the educational environment among related educational programs of computer science and electric power.

Conclusion

From all of the above, we can conclude that there are real prospects for introducing the course into the educational environment. Educational programs in every step can be useful for advanced training of graduates of engineering specialties or students studying natural sciences, preferably with certain specialization options.

The general expectation from both higher education and industry is a human resource with developed personal and technical abilities.

According to the survey results, the main goal of the course in the direction of digital solutions in the field of renewable energy has been fulfilled, interest has shown more than 80 %.

Of course, conducting a course alone is not an indicator, but it has a good potential for further implementation among other universities.

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ЖАҢАРТЫЛАТЫН ЭНЕРГИЯ КӨЗДЕРІНДЕГІ ЦИФРЛЫҚ ТЕХНОЛОГИЯЛАР БАҒЫТЫ БОЙЫНША ОҚЫТУ КУРСЫН ҚАЛЫПТАСТЫРУ

Жыл сайын жаңартылатын энергия көздеріне (бұдан әрі – ЖЭҚ) қызығушылық жаһандық кеңістіктің барлық деңгейлерінде өсіп келеді. Бұл бағыт энергетикалық және экологиялық ғана емес, сонымен бірге жаһандық энергетикалық жүйелердің ұзақ мерзімді тұрақтылығын қамтамасыз ету үшін энергетикалық қауіпсіздік, климаттың өзгеру салдарын азайту және энергияға қол жеткізу сияқты үш негізгі факторды қамтитын жаһандық саяси дыбысқа ие болды. Ол туралы Қазақстан Республикасының Президенті Қ. Қ. Тоқаевтың Үкіметтің кеңейтілген отырысында сөйлеген сөзінде айтылған [1]. «Ұлттық электр желісін дамытуды» талқылау барысында 2030 жылға қарай электр энергетикасындағы жаңартылатын энергия көздерінің үлесін 15 %-ға арттыру тапсырмасы берілді, бұл ауысудың өзектілігі мен қажеттілігін көрсетеді.

Бұл мақалада адамдар тобының (профессорлық-оқытушылық құрам, ғалымдар, студенттер) жаңартылатын энергетикадағы цифрлық технологиялар бойынша оқу курсы қалыптастырудың өзектілігі мен мүдделілігі қарастырылады, бұл осы саладағы мүдделі тұлғалардың санын ұлғайтуға мүмкіндік береді.

Кілтті сөздер: Жаңартылатын энергия көздері, сандық шешімдер, жел энергетикасы, жел фермалары.

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ФОРМИРОВАНИЕ ОБУЧАЮЩЕГО КУРСА ПО НАПРАВЛЕНИЮ ЦИФРОВЫЕ ТЕХНОЛОГИИ В ВОЗОБНОВЛЯЕМЫХ ИСТОЧНИКАХ ЭНЕРГИИ

Ежегодно интерес к возобновляемым источникам энергии (далее – ВИЭ) растет на всех уровнях глобального пространства. Это направление приобрело не только энергетическое и экологическое, но и глобальное политическое звучание, которое включает в себя три основных фактора, таких как энергетическая безопасность, снижение последствий изменения климата и доступ к энергии для обеспечения долгосрочной устойчивости глобальных энергетических систем. Об этом говорится в выступлении Президента Республики Казахстан К. К. Токаева на расширенном заседании Правительства [1]. В ходе обсуждения «Развития национальной электросети» было дано поручение увеличить долю возобновляемых источников энергии в электроэнергетике на 15 % к 2030 году, что свидетельствует об актуальности и необходимости перехода.

В данной статье рассматривается актуальность и заинтересованность круга людей (профессорско-преподавательского состава, ученых, студентов) в формировании учебного курса по цифровым технологиям в возобновляемой энергетике, который позволит увеличить число заинтересованных лиц в этой отрасли.

Ключевые слова. Возобновляемые источники энергии, цифровые решения, ветроэнергетика, ветряные мельницы.

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