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INTEGRATION OF INFORMATION AND COMMUNICATION TECHNOLOGIES (ICTs) IN TEACHING ENGLISH TO PHYSICS STUDENTS

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Abstract. The focus of this study is the issue of English language teaching to physics students through information and communication technologies. Integration of information and communication technologies into English language teaching provides access to a variety of educational materials and interactive platforms and helps to increase the motivation of students and the effectiveness of learning. Teaching English through information and communication technologies to physics students demands a lot of effort from teachers since physics students have specific needs and learning styles that differ from other major students. This article aims to assess the current state of English language instruction for physics students through the use of ICTs and to offer practical recommendations for enhancing English teaching in this context. A survey method was used to collect the data from university teachers. The research found that respondents have a positive attitude toward using information and communication technologies in English language teaching. However, they also face certain challenges in their teaching, such as limited information literacy or a lack of sufficient time to engage with new content. Authors of this research suppose that creating specific interactive web modules, using language-learning applications, video materials, podcasts and including virtual labs contribute to enhancing physics students' English language proficiency.

Keywords: English, teaching, professional English, physics, students, development, information communication technologies, university teachers

Introduction

Integrating ICTs in teaching English to physics students is crucial in fostering their self-study, enhancing motivation and professional skills. The main advantages of using ICTs include the integration of digital technologies, access to specialized online resources, and platforms that facilitate learning in a professionally oriented context. ICTs also play a significant role in developing listening and speaking skills, as well as improving terminology proficiency, through interactive exercises, video materials, and podcasts.

Modern education is undergoing substantial changes and alterations as a result of several factors such as technical advancements, globalization, shifting

labor market needs, and social changes. These shifts have an impact on teaching in higher education institutions, as well as learning styles, teaching methods, and program content. Moreover, education should meet the requirements of the society as well. This issue has been accentuated in the normative document that the education system must be modified in order to fulfill demands the labor market. A number of areas of the national economy are facing a labor shortage, particularly in technical and working specialties. As a result, it is vital to thoroughly address the required education [1].

In this regard, the country needs technical experts who are competent not only in the sphere they are working but also specialists who also know English well. In this article we are considering physics students as physicists play a key role in the economic development of the country. The research and discoveries related to them have far-reaching implications for various aspects of society, the economy and security.

The development of the English language of physics students is a critical undertaking due to science's globalization and integration into the international scientific community. In today's world, English has become the primary means of communication in the scientific community, making knowledge of the language essential for a successful career in physics. In addition to having access to a vast range of scientific material, knowing English enables students to attend international conferences, publish their research findings in prestigious journals, and engage with peers from all over the world.

Use of information and communication technologies (ICTs) can be a crucial element in teaching English to physics students as digital tools and internet resources create new avenues for learning and teaching. The integration of ICTs into English language teaching of physics students contributes to a deeper and better language acquisition, the enhancement of professional skills and the preparation of students for successful careers in the global scientific community. Even though this topic has been extensively studied before, teaching English to physics students through ICTs requires a unique strategy. This research aims at defining the current situation of teaching English to physics students using ICTs and giving several recommendations in using ICTs in English teaching to physics students.

One of the most crucial aspects of enhancing and optimizing educational process is the use of ICTs in English instruction. This adds to the toolkit of methodological tools and techniques that one can use to diversify the types of work. The term "information and communication technologies" is defined in the scientific literature in a variety of ways. ICTs are defined as a collection of instruments and processes for transforming information data into new, high-quality information in the "Dictionary of Education", published by L.M. Luzina [2]. In another reference "Colin's English Dictionary" ICT refers to research and activities that use computers and other electronic devices [3].

Modern education is becoming more and more dependent on information and communication technology (ICTs). They provide fresh possibilities for learning and skill development in addition to revolutionizing conventional instructional techniques. One can use ICTs to set up the right conditions for learning, such as improving the methods, content, and organizational structures. The use of ICTs in the classroom activates the learning process and, to some extent, helps students discover their latent intelligence and creative potential due to their accessibility, wide computing capabilities, and high-quality software selection.

Significant advantages come from using ICTs in education, such as increased learning quality, individualized instruction, the development of critical skills, and increased educational access. The benefits of use of ICTs in university teaching were listed in the article written by Y. Perbawaningsih. She focuses on the advantages of ICTs in education in her research study and claims that ICTs are beneficial both for teachers and students, since use of ICT in education saves cost, time and effort. ICTs offer a wealth of current, diversified, freely available knowledge, frequently at no cost. Moreover, ICTs make it possible for the academic community to carry out its duty of educating the public and fostering prosperity [4].

Authors Shokeen et.al. share Y. Perbawaningsih's ideas that ICTs are effective for both participants of education. They emphasize that use of ICTs the classroom is crucial to provide students with opportunity to acquire and use 21st-century skills. ICTs enhance the process of teaching and learning and make it more crucial for educators to take on the role of environment makers in the classroom. With the use of ICTs, educators may deliver their material in an engaging way and help students at any point in their educational journey [5].

We assume that use of ICTs will be effective in teaching English to physics students since this issue has not been sufficiently discussed in the scholarly papers. This specialized field uses ICT tools to improve learning by fusing language acquisition with subject-specific content. The application of ICTs in English physics classrooms is a fascinating field that has the potential to greatly enhance students' language proficiency and comprehension of the subject matter.

The scientific novelty of this study lies in the comprehensive analysis of the specifics of the use of information and communication technologies (ICT) in teaching English to students of physics, mathematics and technical specialties, which was previously considered fragmentarily. For the first time, the features of perception and assimilation of a foreign language by physics students using ICT were identified, and pedagogical conditions were determined that contribute to the effective integration of digital tools into the educational process. The study found that, despite the positive attitude of teachers to the use of ICT, they face certain difficulties, such as an insufficient level of information literacy and lack of time to master new technologies. In this regard, the feasibility of developing specialized interactive web modules, using language applications, video materials, podcasts

and virtual laboratories aimed at improving the level of professionally oriented communicative competence of physics students is substantiated.

Materials and methods

The aim of this study was to assess the current state of English language instruction for physics students using information and communication technologies (ICTs) and to provide several recommendations for enhancing the use of ICTs in this context. The research employed both theoretical and practical methods. The theoretical component involved an analysis of relevant scientific literature, with a focus on comparison, generalization, and deduction. This approach enabled us to clearly define the research problem.

As a practical research method, a survey method was conducted to collect relevant data. The survey method enables the direct collection of data from participants, facilitating a deeper understanding of their opinions, experiences, and their relationship to the issue under investigation. The respondents were English teachers (N-61) working at various universities of Kazakhstan. The main criterion was that they had been teaching English to physics students.

Thus, the use of questionnaires as a practical research method allowed us to obtain objective and representative data directly from English teachers working with students of physics, mathematics and technical specialties. This contributed to a more in-depth analysis of their professional experience, the difficulties they encounter in the teaching process, as well as an assessment of the effectiveness of the use of information and communication technologies in teaching this category of students.

Therefore, by using the survey as a practical study approach, we were able to directly collect representative and objective data from English teachers who interact with students in physics. This led to a more thorough examination of their work experience, the challenges they face while instructing, and an evaluation of how effectively information and communication technologies work when used to teach this group of pupils.

The first part of the survey was about respondents' age, years of experience, university they are working and majors they are teaching. The participants' ages ranged from 23 to 61, and their professional experience spanned from 1 to 31 years. Teachers were selected based on their consent, in accordance with the principles of voluntariness and informed consent, which ensured the ethical legality of the study. The table below demonstrates the respondents' university affiliations.

Table 1 Respondents' Universities

№	University	Number
1	L.N. Gumilyov Eurasian National University	16
2	Kazakh National Pedagogical University named after Abai	14

3	Korkyt Ata Kzylorda University	11
4	Y.Altynsarin Arkalyk Pedagogical University	7
5	S.Seifullin Agro-technical University	8
6	K.Zhubanov Aktobe Regional University	3
7	M.Kh. Dulati Taraz Regional University	2

Majority of respondents are teaching General English (59%) and General English and Professional English Language (41%), all of respondents teach English (General English and Professional English) to physics at their universities.

The aim of the survey was to define English teachers' attitude to use ICTs in teaching English to physics students. The survey consisted of 20 questions formatted on a 5-point Likert's scale, where teachers indicate the degree they agree with a statement. The answers include: - strongly disagree, - disagree, - neutral, - agree, - strongly agree. The survey questions covered the general information of ICTs use in English teaching and ICTs use in teaching English to physics students.

Results

The following results were revealed from the survey on the use of ICTs in English language teaching. We collected the data on the following table. (Table 2)

Table 2 Respondents' attitude towards the use of ICTs

№.	Question	strongly disagree	disagree	neutral	agree	agree strongly
1	ICTs enhance my knowledge and skills as an English teacher.	4	4	10	32	10
2	I believe that ICTs are more powerful in terms of instruction than discussion without the use of ICTs.	2	5	22	27	5
3	ICTs can replace teachers in teaching English	20	22	10	9	1

From this table one can see that majority of respondents (42) agree or strongly agree that ICTs develop their knowledge and skills as an English teacher, only 8 teachers agree or disagree with this statement. And opinions are more varied related to the statement (I believe that ICTs are more powerful in terms of instruction than discussion without the use of ICTs), with a majority (32 respondents) agreeing or strongly agreeing that ICTs are more powerful than traditional discussion methods. As for the third statement about ICTs replacing teachers' role the majority (42 respondents) strongly disagree or disagree with the idea that ICTs can replace teachers. This means that teachers strongly believe

that their role is irreplaceable in the education. However, a small minority (10 respondents) agrees or strongly agrees with this statement, suggesting some openness to the concept. Neutral answers (10 respondents) might show that respondents are doubt that ICTs can replace teachers.

The data on necessity of ICTs in teaching English for physics students are given on the following figure. (Fig.1)

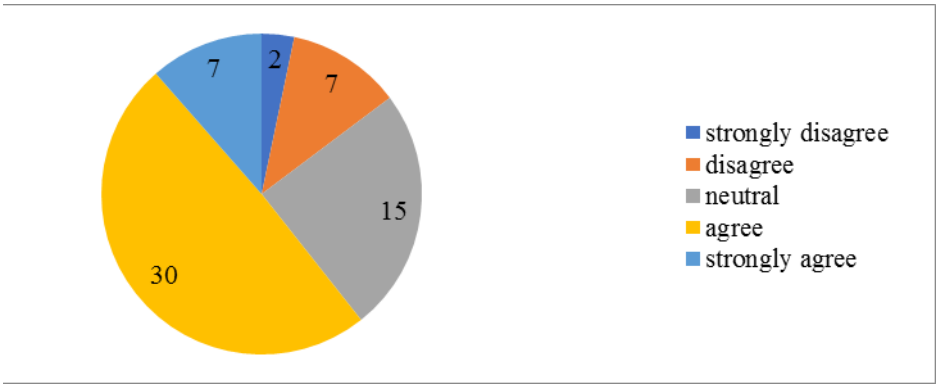

Figure 1 - Necessity of ICTs in teaching English to physics students

The data on the figure suggests that the majority of respondents are in favor of the statement "ICTs are highly necessary in teaching English to physics students". The high number of "Agree" responses (30) and a moderate number of "Strongly Agree" responses (7) indicate that respondents suppose that it is essential to use ICTs in teaching English to physics students. There is a notable portion of respondents (15) who think neutral, indicating neither strong support nor opposition to the statement. We think that it means that respondents do not have enough experience in using ICTs in teaching.

The following figure demonstrates the data taken from the survey on the statement "ICTs influence on physics students learning English". (Fig.2)

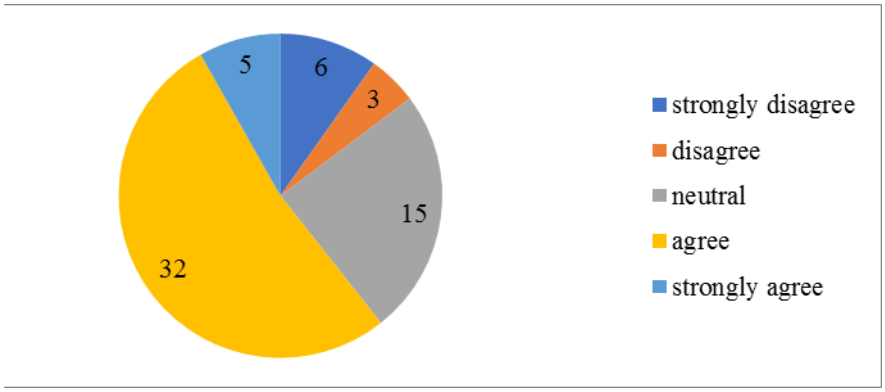

Figure 2 - ICTs influence on physics students learning English

According to the data, most respondents (37) had a positive opinion of the statement while a sizable part had a neutral (15) and a smaller group (9) disagreed. Overall, the trend indicates that most respondents believe that ICTs impact greatly on physics students learning English.

The figure below provides the information about respondents' agreements or disagreements with the statement "I think that through ICTs physics students obtain knowledge and information fast". (Fig.3)

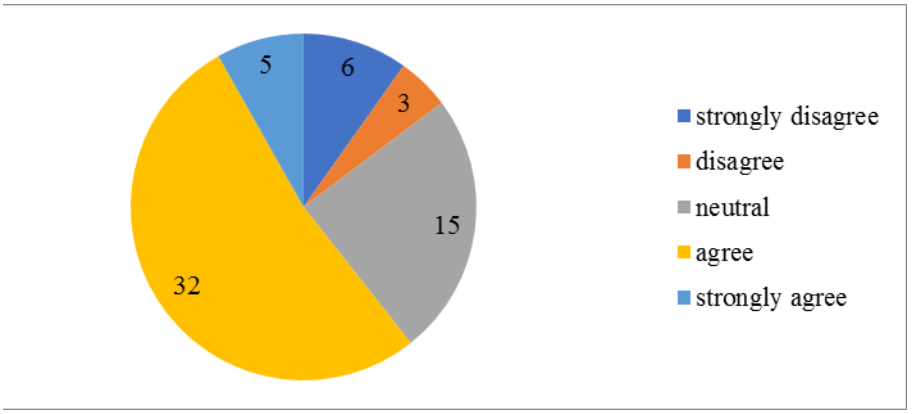

Figure 3 - Responses on through ICTs physics students obtain knowledge and information fast.

The statement is seen favorably by the majority of respondents (41), indicating a general trend towards agreement. A sizable percentage of respondents (19) gave indifferent answers, indicating that a sizable portion of participants were unclear. Only eight respondents disagreed, suggesting that resistance does exist, albeit it is not very strong.

The following figure demonstrates responses on ICTs resources in teaching English to physics students. (Fig. 4)

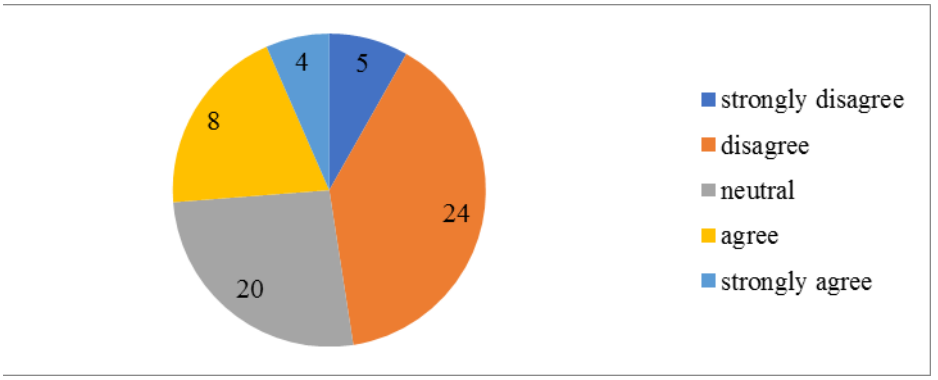

Figure 4 - Responses on ICT resources

According to data, a significant number of respondents (29 respondents in total) opposed or strongly disagreed with the statement, suggesting that the statement was primarily seen negatively. A majority of participants may not have strong opinions, as evidenced by the considerable amount of neutral comments (20 respondents). Only sixteen out of the respondents agreed with the statement, showing a low level of support. These data demonstrate that teachers do not have enough ICTs in teaching English to physics students.

The last point of the survey was listing the obstacles that teachers face in teaching English to physics students. The data were grouped and demonstrated in the following table. (Table 3)

Table 3 Challenges in teaching English to physics students

Topics	The most frequent responses
Lack of ICTs and materials	Lack of audio material and lack of motivation, lack ICTs sources, we don't have enough ICTs, lack of didactic material and qualified teachers/ specialists in this sphere of education, lack of professionally oriented electronic resources for students.
Different level of English of students	Their proficiency in English is varied, I have to differentiate tasks, adapted material suitable for English learners of different levels.
Vocabulary and communication	Technical words, remembering expressions, difficulties with terms, lack of vocabulary and abilities, lack of communication skills, weak knowledge, students are focused on physics only, during the process of learning, students may experience a variety of cognitive, motivational or affective challenges that affect their learning. In the "Our Students as Learners" group, we will focus on how these aspects impact the learning process. As physics students are often focused on technical aspects of their field, they may struggle with communication skills in English, particularly in professional settings such as presenting research findings or writing reports.
Technical problems	Lack of equipment and tools in classroom, bad internet connection.
Other	The challenges that students face when studying physics can be split into two categories: conceptual and practical. On the conceptual front, students may struggle to understand the ideas and apply them. On the practical side, they may encounter difficulties with memorization, time management, and distractions, effective teaching methods.

The information provided on the table demonstrates that English teachers have a lot of problems in teaching physics students determined by the characteristics of the subject and background knowledge of students as well as teaching materials.

Discussion

The findings of this research indicate that respondents have positive attitude towards the use of ICTs in English teaching. They admit that ICTs are helpful in improving their teaching skills and awareness; moreover, they find use of ICTs more effective than without them. The study also shows the diversity of respondents' views about the replacement of instructors with ICTs.

Accordingly, the study's findings show that respondents had a favorable opinion of the use of ICTs in English instruction. When compared to traditional techniques, teachers see that ICT increases awareness, helps them enhance their professional abilities, and improves the efficacy of the educational process. The survey also found that respondents had differing views on the potential use of digital tools to replace instructors, underscoring the need for more research on how to strike a balance between the advancement of technology and human interaction in the classroom.

Regarding the application of ICTs in teaching English to physics students, respondents believe that it is essential and most teachers think that ICTs help physics students improve their English language skills. Additionally, in their view, they help students learn the language more quickly and effectively. There were some responses which indicate that teachers are satisfied with the resources they have (5%), however majority of them think that they do not have enough resources to teach English to physics students. The frequent difficulties that respondents have mentioned are lack of ICT tools and teaching materials, diverse level of English, lack of communicative skills and vocabulary as well as technical problems.

The efficiency of ICT implementation in the educational process is greatly diminished by these challenges, according to the respondents, and their resolution necessitates a comprehensive strategy. Specifically, educators stress the importance of expanding access to technical and pedagogical resources, creating customized digital content tailored to physics students' proficiency levels, and setting up advanced training programs for educators in ICT use. Additionally, students' vocabulary should be expanded and communication abilities should be formed. These can be accomplished by using interactive platforms, online courses, and multimedia apps that are geared toward professional training.

ICTs use gives educators and students new possibilities and enhances the effectiveness, diversity, and interactivity of the learning process. This issue was mentioned in the research conducted by Yu. Ryakhovskaya and other scholars. The authors emphasize that ICTs have the power to enhance the didactic capacity of existing teaching strategies and provide solutions for many of the problems that higher education is currently facing. We agree with the authors' opinion as access to a wealth of instructional resources, including databases, online libraries, and multimedia content, is made possible by ICTs. This enables educators to add varied and pertinent material to their curricula, resulting in a more thorough and in-depth comprehension of the subject matter being taught [6].

ICTs as efficient learning tools open up many opportunities for English language teaching as well. Students may increase the excitement, interaction, and productivity of language learning with the help of contemporary tools and resources. Computer training programs enable the training of different speech activity types and their combinations, the awareness of linguistic phenomena, the

development of linguistic abilities, the creation of communicative situations, the automation of language and speech actions, and the assurance of an individualized approach and the amplification of students' independent work.

A lot of research studies have been conducted on the influence of ICTs on English language teaching. The review of literature on use of ICTs in English language teaching made it possible to understand the various benefits and applications of technology in this field. Many studies are devoted to assessing ICTs use significance in teaching English in universities [7], to identifying potentialities of ICTs as an effective instrument for teaching foreign languages and the results [8] and to exploring the underlying factors influencing an effective ICT-based approach to the teaching of English [9].

When teaching a foreign language, computer applications make the content easier to understand and more accessible than it would be if it were given orally. Additionally, it is critical that the student be able to work independently in the classroom, progressing at his own pace through new material and, if needed, going back to review anything he did not understand. Ramkrishna Mohanta highlighted how ICTs extensive use and appeal have made English a universal language [10]. ICTs are helpful for English teachers and their students in their instructional activities since they allowed them to access educational resources, plan and deliver lessons, and engage in group projects [11].

English is one of the obligatory disciplines in the curriculum of physics students. Physics, as a fundamental science, requires a deep understanding and precise expression of complex concepts and theories. To do this, students need to have not only general language skills, but also specialized vocabulary, terminology, and style of scientific presentation. Therefore, teaching English to physics students should take into account the specifics of their future professional activities and ensure the integration of language and subject knowledge. Dindin Nasrudin considered the importance of English for physics students in the research study The researchers revealed what content and skills are required for physics students related to English classroom. They concluded that the content of English teaching should be adjusted to physics students' necessities [12].

The study by Fadhilah Rahman and other researchers' exploration focused on physics students' English learning needs. Their research found out that highlighted that students need English teaching materials that contain three skills such as speaking, reading, and writing. Moreover, their study identified the topics that physics students would like to learn. According to their research findings, pronunciation mistakes and a lack of vocabulary were the most frequent challenges faced by physics students learning English. Most physics students decide to watch movies or videos to learn English [13].

Farzaneh and other scholars' research concluded that reading is a significant skill that physics students need. They prioritized reading and technical words among other skills and aspects of English language for physics students. In

addition, they need to learn to write abstracts and to present their research results in seminars. They drew conclusions that curriculum of English for Physics major students is not sufficient for their academic needs [14].

The study conducted by M.Naci and Türk Fen aimed at identifying physics students' English learning approaches. They discovered that physics students demonstrate failure in mastering English due to some reasons. Their research found out that lack of successful strategies and methods in their teaching caused students' study beliefs and methods for learning English [15].

The review of sources related to teaching English to physics students indicate that, despite numerous studies on physics students learning English, several unresolved issues and challenges still need thorough analysis and consideration. Teaching English to physics students poses distinct difficulties because of the specialized nature of their field. The primary emphasis should be placed on specialized physics terminology, and efforts should be made to activate its use. Next, scientific texts should be included to enhance their reading skills. This approach will benefit students by not only improving their language proficiency but also deepening their understanding of the subject matter. Additionally, students should engage in writing reports and articles. This practice will help them become familiar with the structure of scientific texts and use appropriate terminology.

The conducted research revealed that a focused method that considers students' linguistic and professional demands must be developed based on the examination of research and real-world experience teaching English to physics majors. Developing written and spoken communication skills in academic and professional settings, working with scientific materials, and using technical terminology are all important components of effective education. ICT integration into the classroom guarantees deeper material assimilation, individualized learning, and readiness for professional action in the global scientific environment in addition to raising students' interest and engagement.

Conclusion

The integration of ICTs into English teaching has a great effect in developing English language skills of physics students. The research findings indicate that using ICTs in English language teaching not only enhances students' language skills, but also it facilitates to make language learning more engaging and understandable. The study revealed the difficulties that our respondents encounter when teaching English to physics students. To eliminate these challenges, we recommend carrying out the following actions.

1.Provide physics-specific interactive web modules that integrate English language education resources. To actively involve students, these modules may incorporate interactive activities, quizzes, and multimedia content.

2. Suggest language-learning applications made especially for physics students who want to get better at speaking English. These applications might concentrate on vocabulary, grammar, and communication skills relevant to physics.

3. Include virtual labs and simulations where students must read and understand instructions written in English. This gives students real-world experience using their English language proficiency in a physics setting.

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ФИЗИКА МАМАНДЫҒЫ СТУДЕНТТЕРІНЕ АҒЫЛШЫН ТІЛІН ОҚЫТУДА АҚПАРАТТЫҚ-КОММУНИКАЦИЯЛЫҚ ТЕХНОЛОГИЯЛАРДЫ (АКТ) ЕНГІЗУ

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Аңдатпа. Бұл зерттеудің негізгі бағыты физика мамандықтарында оқитын студенттерге ақпараттық-коммуникациялық технологиялар арқылы ағылшын тілін оқыту мәселесі болып табылады. Ағылшын тілін оқытуда ақпараттық-коммуникациялық технологияларды қолдану әртүрлі оқу материалдары мен интерактивті платформаларға қол жетімділікті қамтамасыз етеді және оларды оқыту үдерісінде пайдалану білім алушылардың ынтасы мен оқытудың тиімділігін арттыруға көмектеседі. Физика мамаандықтарында оқитын білім алушыларға ақпараттық-коммуникациялық технологиялар арқылы ағылшын тілін үйрету оқытушылардан көп күш жұмсауды талап етеді, мұның себебі физика мамандықтарында оқитын білім алушылардың басқа мамандықтарда білім алатын студенттерден ерекше қажеттіліктері мен оқу стильдері бар. Мақаланың мақсаты физика мамандықтарында оқитын студенттерге ақпараттық-коммуникациялық технологияларды қолдана отырып, ағылшын тілін оқытудың қазіргі жағдайын анықтау және оларға ағылшын тілін оқытуда ақпараттық-коммуникациялық технологияларды қолдану бойынша

бірнеше ұсыныстар беру. Деректерді жинау үшін зерттеуге еліміздің түрлі университеттерінде сабақ беретін 61 оқытушы қатысқан сауалнама әдісі қолданылды. Зерттеу нәтижелері көрсеткендей, респонденттер ағылшын тілін оқытуда ақпараттық-коммуникациялық технологияларды қолдануға оң көзқараспен қарайды. Дегенмен, физика мамандықтарында оқитын білім алушыларға ағылшын тілін оқытуда белгілі бір қиындықтар бар, олар шектеулі ақпараттық әдебиеттер немесе жаңа мазмұнмен айналысуға уақыттың жеткіліксіздігі. Бұл зерттеудің авторлары түрлі интерактивті веб-модульдерді құру, видео материалдар, подкасттар, тіл үйренуге арналған қосымшаларды пайдалану және виртуалды зертханаларды қосу физика мамандықтарында оқитын білім алушылардың ағылшын тілін меңгеруін арттыруға ықпал етеді деп болжайды.

Тірек сөздер: ағылшын тілі, оқыту, кәсіби ағылшын тілі, физика, студенттер, дамыту, ақпараттық-коммуникациялық технологиялар, университет оқытушылары

ИНТЕГРАЦИЯ ИНФОРМАЦИОННО-КОММУНИКАЦИОННЫХ ТЕХНОЛОГИЙ (ИКТ) В ПРЕПОДАВАНИИ АНГЛИЙСКОГО ЯЗЫКА СТУДЕНТАМ ФИЗИКАМ

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Аннотация. Основным направлением данного исследования является проблема преподавания английского языка посредством информационно-коммуникационных технологий студентам, обучающимся по специальности «Физика». Использование информационно-коммуникационных технологий в обучении английскому языку обеспечивает доступ к различным учебным материалам и интерактивным платформам, что помогает повысить мотивацию обучающихся и эффективность обучения. Обучение английскому языку с помощью информационно-коммуникационных технологий для студентов, обучающихся по специальности «Физика», требует от преподавателей больших усилий, так как студенты этой специальности имеют особые потребности и стили обучения, отличные от студентов других специальностей. Цель данной статьи - выявить современное состояние преподавания английского языка с использованием информационно-коммуникационных технологий студентам, обучающимся по специальности «Физика», и дать рекомендации по применению этих информационных технологий в обучении. Для сбора данных в исследовании использовался метод опроса, в котором принял участие 61 преподаватель, работающий в университетах страны. Результаты исследования показали, что респонденты положительно относятся к использованию информационно-коммуникационных технологий в обучении английскому языку. Однако студенты, которые обучаются по специальности «Физика», сталкиваются

с определёнными трудностями в изучении английского языка, такими как ограниченная информационная грамотность или отсутствие достаточного времени для изучения нового контента. Авторы исследования предполагают, что создание интерактивных веб-модулей, видео материалов, подкастов и использование приложений для изучения языка и добавление виртуальных лабораторий будет способствовать повышению уровня владения английским языком у студентов данной специальности.

Ключевые слова: английский язык, преподавание, профессиональный английский язык, физика, студенты, развитие, информационно-коммуникационные технологии, преподаватели университетов

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