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Ғылымның, білімнің және бизнестің интеграциясы
Интеграция науки, образования и бизнеса
Integration of science, education and business

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ADAPTIVE ONLINE EDUCATIONAL PROCESS BASED ON SMART TECHNOLOGIES AND ANALYSIS OF EXISTING SYSTEMS

АДАПТИВНЫЙ ОНЛАЙН-ОБРАЗОВАТЕЛЬНЫЙ ПРОЦЕСС, ОСНОВАННЫЙ НА ИНТЕЛЛЕКТУАЛЬНЫХ ТЕХНОЛОГИЯХ И АНАЛИЗЕ СУЩЕСТВУЮЩИХ СИСТЕМ

ЗИЯТКЕРЛІК ТЕХНОЛОГИЯЛАР МЕН ҚОЛДАНЫСТАҒЫ ЖҮЙЕЛЕРДІ ТАЛДАУҒА НЕГІЗДЕЛГЕН БЕЙІМДЕЛГЕН ОНЛАЙН-БІЛІМ БЕРУ ПРОЦЕСІ

Abstract. The article is devoted to the theoretical consideration of the phenomenon of smart technologies in modern education from the perspective of the development of universal and professional competencies. The process of teaching students involves turning to innovation, since the use of new technologies significantly expands the boundaries of teaching, and obtaining knowledge, and applying existing skills in practice. The inclusion of such innovations as smart technologies in the educational space of a modern University leads to a valuable transition to versatile learning. Students immersion in the sphere of new educational technologies actualizes previously hidden creative and intellectual resources, motivates research activities, and increases the level of cognitive interest. A conceptual model with an adaptive online educational system based on SMART technologies can be used in two possible ways. The first, as an additional tool for modifying the traditional learning process by optimizing repetitive elements that can be automated. Second, to modernize the current learning process by introducing new teaching methods, such as e-learning, m-learning, blended learning, and others. As a result, system promotes shift of teacher-centric approach to the student-centric. Nevertheless, it is noted that the role of the teacher is not leveled, but rather, the teacher acts as a mentor who will be able to maximize his/her potential using SMART technologies. This, in turn, will positively affect the quality of knowledge received by students in this educational system.

Keywords: e-learning, online assessment, adaptive learning, adaptive assessment, adaptive testing, knowledge graph, smart technologies, m-learning, graph theory.

Аннотация. Статья посвящена теоретическому рассмотрению феномена смарт технологий в современном образовании с позиций развития универсальных и

профессиональных компетенций. Процесс обучения учеников предполагает обращение к инновациям, поскольку применение новых технологий существенно расширяет границы и преподавания, и получения знаний, и применения имеющихся умений и навыков в практической деятельности. Включенность в образовательное пространство современного вуза такой инновации, как смарт-технологии, обусловливает ценный переход к разностороннему обучению. Погружение студентов в сферу новых образовательных технологий актуализирует ранее скрытые творческие и интеллектуальные ресурсы, мотивирует на исследовательскую деятельность, повышает уровень познавательного интереса. Концептуальная модель с адаптивной образовательной онлайн системой, основанной на SMART технологиях может быть использована двумя возможными путями. Первый, как дополнительный инструмент для модификации традиционного процесса обучения путем оптимизации повторяющихся элементов, которые могут быть автоматизированы. Второй, модернизировать текущий процесс обучения путем внедрения новых методик преподавания, такие как e-learning, m-learning, blended learning и других. В результате работы системы подход, ориентированный на преподавателя (teacher-centric) заменяется подходом, ориентированным на студента (student-centric). Тем не менее особо отмечается, что роль преподавателя не нивелируется, а наоборот, преподаватель выступает в качестве ментора и наставника, который с использованием SMART технологий сможет максимально раскрыть свой потенциал. Это в свою очередь положительно скажется на качестве знаний полученных обучаемыми в этой образовательной системе.

Ключевые слова: e-learning, онлайн оценивание, адаптивное обучение, адаптивное оценивание, адаптивное тестирование, дерево знаний, smart технологии, m-learning, теория графов.

Аңдатпа. Мақала заманауи білім берудегі смарт технологиялар феноменін әмбебап және кәсіби құзыреттілікті дамыту тұрғысынан теориялық қарастыруға арналған. Оқушыларды оқыту үдерісі жаңа технологияларды қолданып оқыту мен білім алудың және практикалық қызметте бар іскерліктер мен дағдыларды қолданудың шегін едәуір кеңейтетіндіктен, инновацияларға үндеу жасауды көздейді. Заманауи ЖОО-ның білім беру кеңістігіне смарт-технологиялар сияқты инновацияның қосылуы жан-жақты оқуға құнды көшуге себепші болады. Студенттердің жаңа білім беру технологияларының саласына сіңуі бұрын жасырын шығармашылық және зияткерлік ресурстарды өзектендіреді, зерттеу қызметіне ынталандырады, танымдық қызығушылықтың деңгейін арттырады. SMART технологияларға негізделген адаптивті білім беру жүйесі бар тұжырымдамалық модель екі ықтимал жолмен пайдаланылуы мүмкін.. Біріншісі, автоматтандыруға болатын қайталанатын элементтерді оңтайландыру арқылы дәстүрлі оқу процесін өзгертудің қосымша құралы ретінде. Екіншіден, оқытудың жаңа әдістерін, мысалы, электрондық оқыту, мобильді оқыту, аралас оқыту және басқаларын енгізу арқылы модернизациялау. Жүйені енгізу нәтижесінде мұғалімге бағытталған бағытталған оқу процессі оқушыға ауыстырылады. Осыған қарамастан, мұғалімнің рөлі азаймайды, керісінше SMART технологияларды қолдана отырып, мұғалім өзінің әлеуетін дамыта алатыны ерекше атап өтіледі. Бұл өз кезегінде студенттердің осы білім беру жүйесінде алған білім сапасына оң әсер етеді.

Түйін сөздер: электронды оқыту, онлайн бағалау, бейімделгіш оқыту, бейімделгіш бағалау, бейімделгіш тестілеу, білім ағашы, смарт технологиялар, мобильді оқыту, граф теориясы.

Introduction. The development and emergence of new technologies and solutions in one area can lead to a chain reaction in another. For example, increasing the amount of memory in the computer at one time led to the creation of the ability to store new data formats, such as digital images, audio and video recordings. The development of the Internet has led to the possibility of instant dissemination of information around the world. Over the past few decades, with the advent

of new IT technologies, the direction of virtual learning has been developing. In developed countries, such as the United States, South Korea, and the United Kingdom, virtual education systems are being created, which have a number of significant advantages over the traditional form of education. In the Republic of Kazakhstan, virtual learning has just begun to gain momentum.

In recent years, it has become popular to get education online. In addition, due to the emergence and spread of coronavirus around the world in late 2019 and early 2020, most companies stopped operating or switched to online operation. The same applies to educational institutions from schools to universities. The sudden increase in attention and examples of practical applications or the transition to an online format has led to a more productive growth in the number of e-learning research. Martin Ebner and others analysed the process of transition of the educational process from the traditional offline to online format on the example of the Austrian University Graz University of Technology (TU Graz) [1]. In China, the government initiated the "School's Out, But Class's On" campaign, which involves creating a large-scale online educational application for students from all over the country [2]. Because of the quarantine, more than 270 million Chinese students were forced to go online. In order for the systems to support the load from such a large number of users, cloud technologies were used, which allow you to develop solutions designed for very large loads. This is not an isolated example of using cloud technologies in e-learning. The article by Abderrahim El Mhouti and others reviews existing e-learning solutions based on cloud technologies [3].

It is worth noting the role of the state in the development of e-learning in the country. For example, in China, as part of the "School's Out, but Class On" campaign, the government made adjustments at the legislative level to implement a large-scale project to provide e-learning training format for the entire country. Among the most interesting changes in the laws is that now the learning process is not focused on the teacher (teacher-centric), but moves to a student-centric orientation (student-centric) and the teacher acts as a mentor and mentor. This approach was used by innovators from India who developed a SMART mobile Android app [4]. The main idea of this app is that to implement the m-learning learning process, you need to switch from the teacher-centric approach to the student-centric one. These changes will provide an opportunity to personalize the learning process, build an individual learning path and conduct adaptive testing. the positive aspects of implementing SMART technologies in the learning process.

The most advanced types of e-learning systems are adaptive e–learning. The main idea of which is to personalize the learning path for each student. In order for the system to be adaptive, various approaches can be applied. Hsiao-Chien Tseng et al. in their work, they used the concept maps theory developed by Novak and Musonda in 1991 [5]. The development allows you to select the next material/course individually from a specific set of training materials or courses based on the available data about the student.

Dalal Abdullah et al. in their work, they propose a model of an adaptive educational system, in which the assessment process is adaptive, i.e. adaptive e-assessment [6]. The system can be integrated with other solutions, as it is developed as a separate module. In the case of the authors, the solution was integrated with LMS Moodle. The authors argue that it is impossible to create an adaptive educational system if it does not adapt the assessment process, i.e. feedback from the student to the teacher. We fully agree with this statement and one of the main components of our system is adaptive e-assessment.

In general, adaptability in learning is understood as personification of the educational process based on the creation of electronic courses that take into account the individual characteristics of students, including the level of initial knowledge, speed of perception and psychological characteristics.

Thanks to such information educational technologies, it is possible to organize the educational process at all stages of working with students at a higher level, systematically evaluating their subject achievements, forming knowledge, skills, competencies and skills. In addition, the computer system of adaptive learning is a kind of "teacher" and "psychologist" in the development of a

number of important properties and qualities of students, the formation of their all-required skills, abilities and professional competencies.

The main contributions are summarized as:
- Gathering analytical information about the websites using a crawler by accessing them, analyzing their content, and identifying their types.
- Classification of the websites on topics, state of being licit based on collected information.
- The basic concepts of adaptive educational process and principles of adaptation in training are given. The characteristics of adaptive learning are considered. The advantages and disadvantages of adaptive learning are described. The problems that are solved when building adaptive learning systems (AOS) are discussed.

The reminder of the paper is organized as:
- Section II contains problem identification.
- Section III includes the salient features of related works.
- The last Section IV concludes the paper.

Problem identification. The problem of creating computer-based training programs that can effectively organize the content of the training course, as well as learning strategies and modes of active interaction between the student and the computer, is one of the most important problems of computer-based learning. This type of training also has disadvantages, which include the following:

The need to detail the training course and duplicate its elements with varying degrees of detail in the presentation of the material, which leads to a significant increase in the complexity of developing the training course;

The need to perform frequent knowledge monitoring. In order to have as much objective information as possible about the current level of knowledge of the student, therefore, it is necessary to frequently conduct testing in various sections of the course. This disadvantage can be mitigated by using adaptive knowledge testing algorithms, which can reduce the testing time, reducing the load on the learner.

Thus, thanks to intelligent adaptive learning systems, you can improve the quality of training and reduce the costs that are necessary for organizing an online educational process.

Related works. The salient features of existing methods are briefly explained in this section.

Knewton adaptive learning system, founded by Jose Ferreira. Knewton has come up with courses that continuously adapt to the characteristics of each student. With traditional methods, gaps in knowledge grow like a snowball–it is necessary to understand one topic as soon as the other is taken. Thanks to a personalized flexible course, the system instantly responds to every action, identifying topics that the user does not understand [7].

Knewton sees the essence of adaptive learning as follows: you need to adapt to the level of knowledge and goals of the student, calculate their weaknesses and fill in the gaps every minute. For more effective training, the platform provides tips on what you should work on right now, and selects suitable tasks.

In order to select a suitable task, Knewton analyzes training materials by hundreds of parameters: highlights key ideas, concepts "Smart Sparrow - Adaptive eLearning Platform". Smart Sparrow. Retrieved March 23, 2013.theories, analyzes the structure, format and level of complexity.

In Knewton's understanding, adaptive learning must respond in real time to the individual learner's results and actions in the system. This approach increases the likelihood that the student will receive the right educational content at the right time and achieve their goals.For example,if the learner is having difficulty coping with a certain set of questions, the Knewton system can guess which topics are not clear to them in this list of questions and offer them content that they can use to improve their understanding of these topics.

SmartSparrow, an Australian startup, has developed an open platform that allows teachers to develop interactive courses themselves and use the system's intelligent capabilities to adapt the

curriculum to each student [8]. More than a dozen courses have already been created on the basis of this platform, mainly at the University level. Thus, SmartSparrow Is a powerful online platform for creating a new generation of interactive and adaptive courses. Lessons created using the SmartSparrow online platform change based on students ' interaction with them. Teachers can identify specific student misconceptions and address them through adaptive methods and feedback that proves a personalized learning experience. Teachers gain insight into the learning landscape in real time, allowing them to reflect on the merits of their learning and adapt it to the needs of their students in a continuous improvement cycle [9].

Adaptive learning system Math garden system serves to improve math skills and is an online environment for students to practice math at their level. This service is available to families, schools, and other educational institutions. Math garden includes a huge range of exercises, so it is suitable for users of any age [10].

The basic program for this system provides detailed data on the performance of its users: group and individual execution, tracking performance improvements over time-understanding weaknesses and strengths, and typical errors.

Math garden uses innovative adaptive systems that were developed at the University of Amsterdam. This system automatically adjusts the complexity of mathematical exercises depending on the user's abilities. All users, both experienced and novice, always receive items that match their level of knowledge.

Conclusion. E-learning systems are considered adaptive when they can dynamically change in response to individual student differences. Major challenges faced by researchers and instructors are to optimally integrate learning theories and instruction strategies with system functions and to empirically examine the effects and value of these systems in real-world environments. To enhance learning effectiveness for all students, this study developed an e-learning system based on an integrated theoretical framework that consists of adaptive instruction strategy, dynamic scaffolding theory, and self-assessment mechanism. The developed adaptive e- learning system can take the dynamic student ability into account and deliver suitable learning materials to all students.

The results of this study can be of reference for system developers, programmers, platform operators, teachers, and relevant personnel in education in the hope to conduct a successful adaptive e-learning environment. Particularly, the results suggest that teachers can employ rubrics as a self-assessment tool to support students with dynamic scaffoldings to conduct a learner-centered e-learning environment.

This study, like much of the empirical research, has limitations that should be addressed. First, the lack of generalizability is clearly a limitation of the present data due to a few participants. The findings for this study cannot be generalized across a large population because participants in this study were selected from the same university. This study still retains considerable space for growth. Future research could consider the other individual learner variables and provide dynamic scaffoldings for them.

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АУА-РАЙЫНЫҢ АВИАЦИЯҒА ӘСЕРІ ЖӘНЕ ОНЫҢ САЛДАРЫ

ВЛИЯНИЕ ПОГОДЫ НА АВИАЦИЮ И ЕЕ ПОСЛЕДСТВИЯ

THE AFFECTS OF THE WEATHER ON AVIATION AND ITS CONSEQUENCES

Аңдатпа. Бұл мақаланың басты мақсаты - ауа райының ұшу қауіпсіздігіне қалай әсер ететінін, одан кейін оның салдары қандай болатындығын және ауа райының авиацияға қалай әсер ететінін анықтау. Автор тірі мысалдарды келтіре отырып, метеорологиялық құбылыстың себептері мен салдарын кеңінен ашады. Автор ауа-райының әрқайсымыздың өміріміздегі рөліне және авиация саласында қандай рөл атқаратындығына ерекше назар аударады.

Түйін сөздер: авиация, ауа-райы, әсерлері, салдары, метеорология, ұшу қауіпсіздігі.

Аннотация. Цель этой статьи - узнать о том, как погода влияет на безопасность полета, какие последствия оно имеет после нее, и вообще о том, как погода влияет на авиацию. Автор широко раскрывает причины и последствия этого метеорологического явления, приводя живые примеры. Автор обращает особое внимание на роль погоды в жизни каждого из нас и конечно же какую роль оно играет в сфере авиации.

Ключевые слова: авиация, погода, аффекты, последствия, метеорология, безопасность полетов.