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**ДОКЛАДЫ**

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## **CREATING SMART UNIVERSITIES AS A CHALLENGE TO MODERNITY**

**Abstract.** The main trends in modern society is the rapid development of information and computer technologies (ICT), communication channels and means of transmission and exchange of information, the integration of knowledge and technology, an increase in the number of open innovations, the transition to new forms and methods of organizational activity. This brings the world to a new “evolutionary revolution”, transforming the information society into what is commonly called the term smart society. In the era of the information society, the most competitive will be universities that can implement the ideas of creating a smart university.

The article discusses the international experience of foreign scientific communities in the study of the structure, properties and functions of smart universities. The problems of ensuring the competitiveness of universities by embedding the system of higher education in modern market conditions through the use of modern information and communication technologies and the transition from the traditional management structure to process management, as well as the conditions and nature of the introduction of changes in the educational system of the Republic of Kazakhstan are considered.

**Keywords:** Smart University, Smart Teachers, Smart Pedagogy, industrial revolution, innovative technologies.

**Introduction.** In the Message to the people of Kazakhstan of the President Kazakhstan N.A. Nazarbayev there is important point in which his told about reconstruction all spheres of life on the basis digital technologies, to be exact about transition to "the Industry 4.0" [1].

In present time in scientific community the concept of the fourth industrial revolution, based on these changes in the system preparation highly professional shots for progressive economy of Kazakhstan in the conditions transition to Smart society and digital technologies is actively discussed.

Relying on the international experience it is possible to tell that the educational institutions capable to embody the ideas of creation the Smart university would be the most competitive. They can provide base for realization in Kazakhstan a concept as Smart education, Smart economy and Smart society.

It is obvious that in the conditions of development society the educational paradigm will also change. The smart universities will perform new functions. Respectively, requirements to electronic training courses which provide needs of pupils for educational resources will change.

Objective of this research is theoretically to prove properties of the smart university, its structure and components and also for check it efficiency use experimentally.

**Materials and methods.** The retrospective analysis of foreign literature where researches problems of transformation digital technologies in an education system and their developments were described is carried out. Also character and conditions their influence on the structural macroeconomic processes in various innovative digital systems which are constantly in the center attention of scientific community. The significant contribution in the solution these problems are made such scientists as Vladimir L., Dzhefry P., Robert J., Lakhmi K., Palagin A.V., K.S. Malakhov and many others.

The scientific references, conclusions and recommendations which are contained in works of domestic and foreign scientists which researches were used in writing this work have huge value for studying the direction and the nature transformational changes in conditions of the fourth industrial revolution. Also it would be desirable to note how shows the analysis of literature, features development

and occurrence of crises in recent years, this question is studied not enough that does this theme relevant. Not so long ago various researchers and developers began to present the visions to SmU (smart university), SmC (smart class), SLE (smart learning environment), a smart campus, the smart teacher, smart pedagogics, etc.; the summary of several remarkable publications on these themes are the review of classical literature is given below.

**Results.** Smarts University (SmU) are the university at which combined the internet resources and technological innovations as in new quality processes and results of educational, research, commercial, social and other university activity.

Tikhomirov presented the smart education vision as follows: "The smart university is a concept which includes complex modernization of all educational processes. Smart education is capable to provide the new university where the ICT set and teachers lead to absolutely new quality results the university activity" [2]. Also it would be desirable to note what according to Tikhomirov can be understood that the concept Smart in education involves emergence such technologies as Smart Board (clever boards), Smart Screen (clever screens) and wireless Internet access from everywhere. It in the turn will result in availability of the necessary information to students, but follow to consider that with it the so-called "wave of information" which will need to be filtered and taken active users only a small part this mass of data will also come.

It should be noted that many authors consider that when determining the clever university it is also necessary to consider its components as: "Smart Learning Environments, Smart Education, Smart Teachers, Smart Pedagogy, and Smart Learner".

Smart Learning Environments (SLE) is using number digital technologies for support training, education and studying; they also give the visible index on how future educational environment can be created. Thus, while technologies continue to progress, SLE receive the growing attention from research community [3].

Mona Denden and Ahmed Tlili consider that for present generation the same schemes and processes training on which their fathers and mothers were engaged became outdated. Therefore they decided to change the program training, introducing Smart Learning Environments, thereby facilitating digestion material, without loss volume and quality of the provided information [4]. How did it at them turn out? The answer it was quite simple, and the decision quite clever. Though the most often used method for modeling to the identity the pupil is the self-report with use questionnaires, in the research they presented and checked recently developed basis for implicit modeling persons of pupils in the game educational environment with use their game behavior and innovative technologies. In particular, their research allocates several game Smarts environment which need to be collected for modeling the personality and also a way of collecting these Wednesdays with use of various game scenarios which researchers and practicing can use when developing the games. It can be considered as the training environment supported by technology which provides adaptation and provides the corresponding support in the right places and in due time depending on needs of certain pupils that can be defined by the analysis their behavior in the course training, progress, online and in real time. Authors compared 2 groups, the first are them studied by traditional methods training in traditional educational environments, other group gained knowledge in Smart environments with the same similar methods teaching. Results of their research were as follows: the 2nd group in comparison with 1 group, had 23% above than a GPA, the volume of the memorable information grew by 13% and for 28% rose total number persons interested to profound studying subject gone to SLE.

Scientists from the People's Republic of China Ri Ting Ru and MinggHua Yu marked out ten key features for smart educational environment for students to whom are necessary of improvement knowledge and skills training [5]:

1. Information on location: learn location of the pupil in real time;
2. Accounting a context: to investigate various scenarios and information on student activity;
3. Socially awareness: feeling the social relations;
4. Compatibility: to establish the standard between various resources, services and platforms;
5. Seamless connection: provides continuous service at connection of any device;
6. Adaptability: to advance an educational resource depending on access to training, preferences and demand

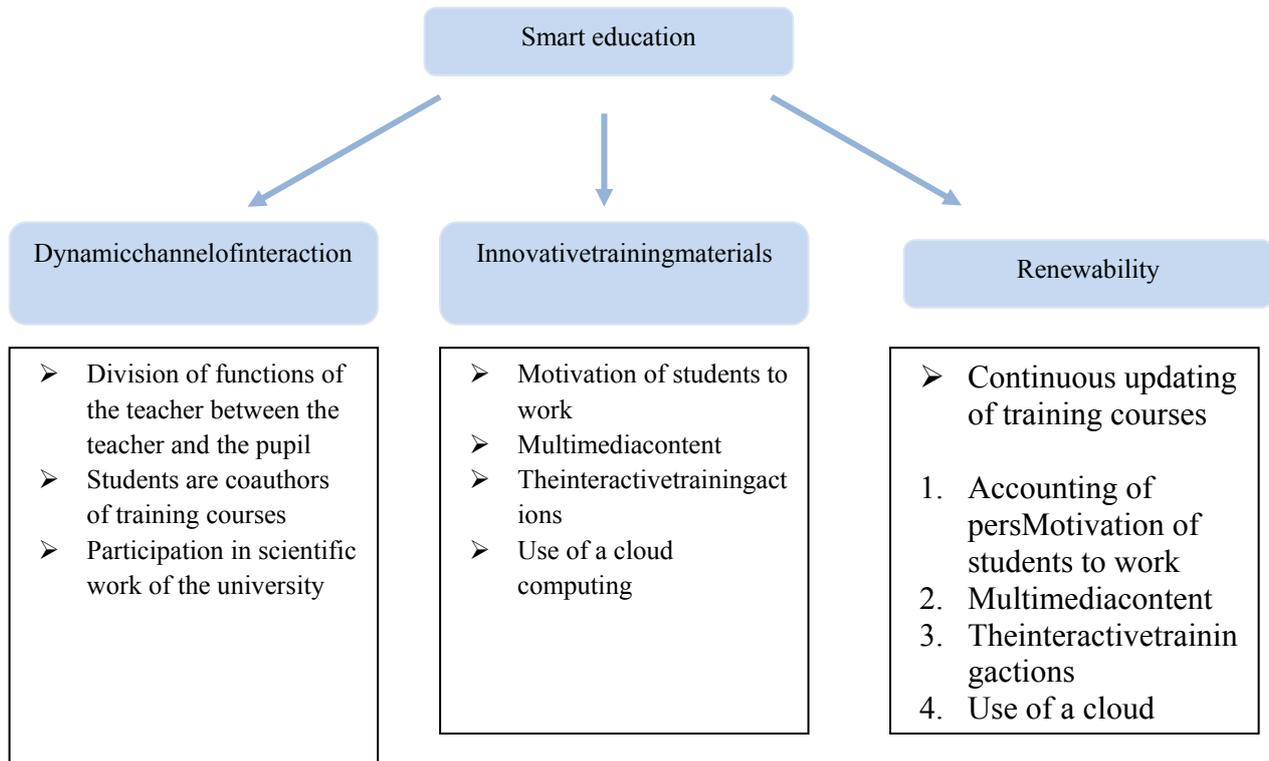
7. Distribution is universal: to predict pupils needs until they are not accurately expressed, to provide a visual and transparent way of access to educational resources and services for pupils;

8. Full record: to write down data on a way training and to deeply analyses then to give a reasonable assessment, the offer and to help on demand;

9. Natural interaction: transfer feelings of multimodal interaction, including recognition the situation and look;

10. High involvement: immersion in polydirectional experience training in Wednesday interaction with rich technology.

Smart Education (SmE) is main "Smart" process of the smart university.



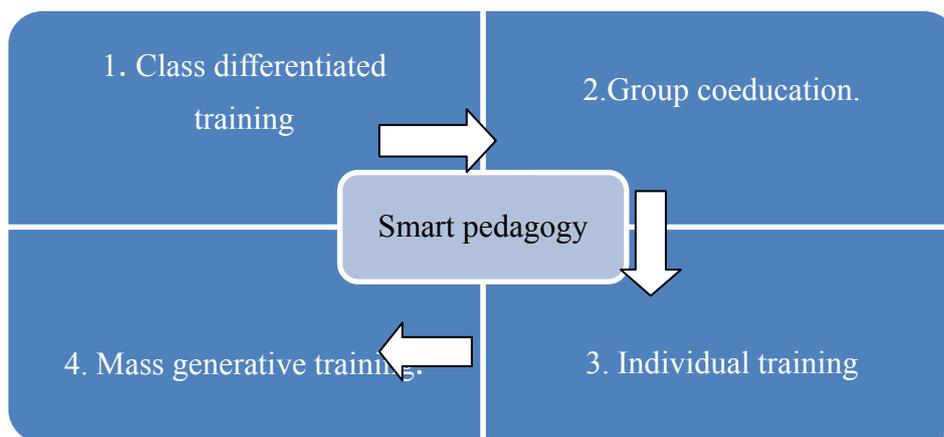
Scheme No. 1 - Three basic functions of smart training [6]

During in an era information society, development concept of the Industry 4.0, will appear the most competitive the higher education institutions capable to realize the ideas creation of smart university. They can make base for implementation in Russian conception of smart-education, smart-economics and smart society [7].

In scientific works from South Korean scientists Cheyon Ha and Cu-yong Li is specified that the research and implementation intellectual training in the state education is a significant step on the way to improvement the process and quality of training. During the research they studied the different variables connected with teacher's views of intellectual training. Though the persons responsible for development policy invested heavily in schools for creation the best technological infrastructure, intellectual training is not completely implemented at real schools. Schools and classrooms made changes in process of development technologies. Nevertheless, all promises which intellectual training tries to give in classrooms are not quite noticeable because one technology cannot lead to changes in pupils training. Therefore, to create a stable basis for the successful smart educational environment at schools, politicians and administrators should support teachers and encourage them to use computers and others new technologies in a class. This support includes change of training programs from traditional lectures on the interactive classes which were more oriented to students. Also their research shows how psychological variables teachers are closely connected with successful implementation of smart training in concrete classes [8].

Smart teacher (SmT) is the teacher who is keeping up to date, able to use innovative technologies in the course of the pupils training, actively improving the professionalism and skills. The smart university depends on comprehensive strategy, including people, objects and continued support teachers and also effective using technologies. SmU encourage clever teachers and provides them smart tools and continued support for performance work, at the same time estimating their pedagogical efficiency by means the clever forms of assessment.

With fast development of technologies more and more flexible and effective training methods for students develop. Researches in the field of cognitive science showed that knowledge and skills are closely bound [9]. Training processes have to be adapted according to educational pupils needs including requirements, experience, interests, preferences, etc. [10]. Change of traditional training methods and the students environment led to emergence "Smart pedagogy" (SmP). The intellectual pedagogics system includes differentiated training at class level, group coeducation, individual training and mass generative training.



Scheme №2 - Four-level structure of SmP [5]

1. The differentiated training is the process of approach to teaching and training for pupils with different abilities in one class.

2. Group coeducation is a situation when two or more persons study or try to study something together.

3. Individual training is the personalized training defined as adjustment of speed (individualization), correction approach (differentiation) and connection to interests and pupils experience for satisfaction pupil needs and support for development abilities to training among certain pupils [11].

4. The fundamental concept of generative training includes creation and improvement personal intellectual constructions about the environment. The purpose consists in allowing pupils to participate in creation the transferred content and to form contexts training and transfer for creation the intercontextuality. When students study online, they can connect new information with old, acquire significant knowledge and use the metacognitive abilities [12].

At integration all these aspects and processes leads not only training process, but also process of storing large volumes to the obtained information improvement.

The 21st century demands from people skills and competence effectively to function at work and in free time. Education has to prepare labor for demand. Thus, the purpose of clever education consists in bringing up clever pupils for satisfaction requirements work and life in the 21st century. From here also the concept about Smart Learner (clever pupils (SmL)) is the persons trained in the conditions the smart university competent of the disciplines with competitive qualities in labor market follows. Based on China researches scientists [13], they allocated four levels of clever abilities which students have to seize to satisfy requirements in modern society.

1. Basic knowledge and main skills. The basic knowledge and the main skills relating to knowledge and skills of the main objects, such as STEM, reading, letter, art, etc. Possession of these main objects is important for student's success.

2. Comprehensive abilities. Comprehensive abilities are understood as abilities to critical thinking and the solution for real problems. These abilities allow the student to use the corresponding reasoning's and complex thinking in various difficult situations.

3. Individually experience. This ability demands that students seized information and technological literacy, creativity and innovative skills on personal experience.

4. Collective thinking. The mode work which demand communication and cooperation. Collective intelligence belongs to knowledge which is accumulated by group people to communication and collaboration.

Above-mentioned abilities are grouped in knowledge, skills, the relations and values. If the student seizes all these abilities, then he will be considered by right as "the clever pupil".

Scientists of the East Kazakhstan State University named after S. Amanzholov designed the transition to the university into the Smart-University model in the main areas:

- changing the organizational structure of the university, the network management and the formation the electronic network interaction system between the teacher and the student, including through the active use the Internet resources with the transition to process management and resource renewal;

- the use in the educational process innovative information and communication technologies that allow the transition from the traditional system to distance education for a flexible system in the formation of individualized educational trajectories using educational content from the best world and domestic universities, which is in the public domain;

- the use of modern management and analytical information systems and related infrastructure in the management of the scientific and educational process, ensuring the implementation the ideas Industry 4.0.[14].

Currently in East Kazakhstan State University named after S. Amanzholov makes the transition from the classical model university to the model Smart-university. The basis for such a transition was the creation single information and educational space of the university on the basis digital technologies, i.e. high school environment.

Smart universities are the key to creating an intellectual nation; it is foundation for our country's smart cities, which will eventually create smart Kazakhstan.

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**Conclusion.**Today development innovative technologies leads to change in education that corresponds to transition to the fourth industrial revolution. Based on the international experience our foreign colleagues, this transition will lead to introduction of Smart industry. For successful introduction and function such processes as in the Republic of Kazakhstan, it is required to create a stable basis for successful SLE in educational institutions, and politicians and administrators to have to support SmT and encourage SmL for strengthening the principles and features the SmE. A key element for the concept SmU is smart learning, which is impossible without accumulated e-learning experience. The main task for smart learning is to create conditions to obtaining new efficiency in the educational process. New efficiency is achieved by students studying in the university program, teachers and the university as a whole. The use of smart learning requires an integrated approach, including an organizational approach, technological and pedagogical. At the heart of smart learning is a strategic decision for the leadership to create and maintain conditions to the development of smart learning, which is ensured by the adoption a university strategy or roadmap. The technological approach should solve the problem of interaction participants in the educational process, both of them in the educational environment and beyond. Successful implementation and operation the smart universities require support from the state, which can lead to the expansion and prosperity the educational system in the Republic of Kazakhstan.

Also we reviewed the strategic management of universities, their competencies and missions.

The development strategy of the research activity in Narxoz is aimed at positioning the university as a Innovative Economic University, strengthening the scientific potential the University of Narchosis, occupying worthy places in world rankings, obtaining international accreditation, enhancing the research competence teaching staff and students, providing impact on solving social and economic problems in our country and Central Asian countries through research and development.

Kazakh Ablai Khan University is a modern innovation-oriented university of internationally-adaptive type as a single scientific and educational complex that provides training for competitive high-quality specialists to ensure the multi-vector international cooperation of the country in implementing the development strategy of the Republic of Kazakhstan.

The Turan University being an innovative entrepreneurial university, will prepare specialists focused on entrepreneurship, innovation, able to adapt to changing socioeconomic conditions, and secure a leading place among domestic universities and competitive positions in the global market for educational services and research programs using innovative technologies in the learning process.

KazNMU named after Asfendiyarov being an innovative medical university participates in the formation a new generation of medical workers with a level professional training, technological skills and competitiveness that meet modern priorities and future challenges for Kazakhstan and world health in the 21st century.

It should be borne in mind that for the successful implementation innovatively progressive technologies in the education system of Kazakhstan, it is necessary to generalize the concepts of smart universities and smart education for the best functioning in various fields of activity and education.

Thus, the presence higher quality education is a necessary condition for the adaptation a young person to the solution a wide class of vital tasks. SMART education allows expanding the personal possibilities development in solving these problems in situations a changing world. It is this, in our opinion, which forms the creative potential to the future specialist, so necessary in modern conditions.

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#### **ҚАЗІРГІ ЗАМАНЫҢ ШАҚЫРУЫ РЕТІНДЕ SMART УНИВЕРСИТЕТЕР ҚҰРУ**

**Аннотация.** Қазіргі заманғы қоғамдағы негізгі үрдістер ақпараттық және компьютерлік технологиялардың (АКТ), байланыс арналарын және ақпарат алмасу және ақпарат алмасуды, білім мен технологияны интеграциялауды, ашық инновациялар санының артуын, ұйымдастырушылық қызметтің жаңа нысандары мен әдістеріне өтуді жедел дамыту болып табылады. Бұл бүкіл әлемді жаңа «эволюциялық революцияға» айналдырып, ақпараттық қоғамды әдеттегі «ақылды қоғам» (ақылды қоғам) деп атайды. Ақпараттық қоғамның дәуірінде ең бәсекеге қабілетті университеттер болады, олар ақылды университетті құру идеяларын енгізе алады.

Берілген мақалада шет елдердегі ғылыми қоғамдардың ақылды университеттер қызметі, құрылысы мен ерекшеліктерін зерттеудегі халықаралық тәжірибесі қарастырылады. Қазақстан Республикасының білім алу жүйесіне өзгерістер енгізудегі шарттары мен өзгешеліктері.

**Түйін сөздер:** Smart University, Smart Teachers, Smart Pedagogy, өндірістік революция, инновациялық технологиялар.

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#### **СОЗДАНИЕ SMART УНИВЕРСИТЕТОВ КАК ВЫЗОВ СОВРЕМЕННОСТИ**

**Аннотация.** Основными тенденциями в современном обществе становится стремительное развитие информационно-компьютерных технологий (ИКТ), каналов коммуникации и средств передачи и обмена информацией, интеграция знаний и технологий, увеличение количества открытых инноваций, переход на новые формы и методы организационной деятельности. Это подводит мир к новому «эволюционному витку», трансформируя информационное общество в то, что сегодня принято обозначать термином smart-общество (smart-society). В эпоху информационного общества наиболее конкурентоспособными окажутся вузы, способные воплотить идеи создания smart-университета.

В статье рассматривается международный опыт зарубежных научных сообществ в изучении строения, свойств и функции умных университетов. Рассматриваются проблемы обеспечения конкурентоспособности

вузов путем встраивания системы высшего образования в современные рыночные условия через применение современных информационно-коммуникационных технологий и перехода от традиционной структуры управления к процессному управлению, а также условия и характер внедрения изменений в образовательную систему Республики Казахстан.

**Ключевые слова:** Smart University, Smart Teachers, Smart Pedagogy, промышленная революция, инновационные технологии.

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