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MODERNISATION OF HIGHER EDUCATION IN CENTRAL ASIA  
THROUGH NEW TECHNOLOGIES  
(HiEdTec)



## REPUBLIC OF KAZAKHSTAN

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### **THE CONCEPTION of adapting the higher and postgraduate education system for the digital generation**



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The conception of adapting the higher and postgraduate education system for the  
digital generation

HiEdTec



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## INTRODUCTION

The Governmental program "DIGITAL KAZAKHSTAN" for 2018-2022 year indicates that "Creating a Digital Future" assumes the ensuring long-run sustainability, the starting digital transformation of the country through the increase of the development of the human capital level, which also requires digital transformation of Education with an outperforming rate.

In Kazakhstan, same to the rest of the world, a digital generation has evolved, which is called as the "generation of the seven screens" – the TV, computer, laptop, tablet, phablet, smart phone and smart watch. As a result of such dense of the digital environment and constant interaction with it, "the new generation of students think and perform the data-handling procedures in a fundamentally different way from the previous generation". / Marc Prensky /

The digital generation cannot and should not be taught in the same way as their parents had been taught. It is not a good idea to teach this generation writing on a blackboard with a white chalk. At the same time replacing the blackboard with a white one, and the chalk with a marker doesn't change things, meaning that, this is not the way to motivate students of today to gain knowledge and to develop skills for successful integration on the job market.

What is needed to be done – is adapting of the educational system to the digital generation by massive and effective application of ICT-based innovative educational technologies and didactic models, giving the opportunity for EVERYONE to learn on 24/7 FORMAT at ANY place with the help of ANY lecturer using ANY device (computer, laptop, tablet, phablet, smart phone, etc.).

At the same time, it is necessary to use the research approach of teaching more actively, aiming to develop students' research skills, creative thinking skills and abilities based on IT-competencies.

But we have to emphasize that information and communication technologies that are not a panacea to all problems in the education system, but are just a tools which could make lectures and seminars more informative and more attractive to the digital generation. **Educators will retain their key role in an interactive teaching process oriented to learners' needs.**

Here we should also mention that the reputation of an educator and the effect of his/her activities will depend more and more not only on his/her level of mastery of the course content and on his/her pedagogic competence, but also on **the extent to which he/she applies modern information and communication technologies for collecting, processing and delivering the specific teaching material.**

**In other words – the education in the digital era has to be redefined and the educational paradigm must be shifted, because learners do not want to study the traditional way any more and educators should not keep on teaching in the conventional way.**



## PREREQUISITES

1. The upcoming adoption of the **EU DIGITAL EDUCATION ACTION PLAN 2020**.
2. **The priorities** of the Education, Audiovisual and Culture Executive Agency at the European Commission published in 2018, one of them is directed to the **“MODERNIZATION OF THE HIGHER EDUCATION THROUGH NEW EDUCATIONAL TECHNOLOGIES”**.
3. **The Governmental Program “DIGITAL KAZAKHSTAN”**, approved by the governmental order of the Republic of Kazakhstan No. 827 December 12, 2017.

## GOAL

**The goal of the Conception (programme) is to adapt the higher and postgraduate education system to the digital generation by introduction and effective implementation of innovative educational technologies and didactic models in teaching, thus providing the opportunity for EVERYBODY to learn at ANY time and at ANY place with the help of ANY lecturer using ANY end device – computer, laptop, tablet, phablet, smart phone, etc.**

## OBJECTIVES

### **1. KEEPING AND GRANTING THE LEADING ROLE OF EDUCATORS THROUGH TAKING TARGETED ACTION TOWARDS:**

- 1.1 Writing a Guide to Innovative Educational Technologies.
- 1.2 Publishing the Guide and disseminating it to all educators in:
  - paper version;
  - interactive multimedia version on the Internet.
- 1.3 Creating a publicly accessible virtual library of video lectures on the main topics of the Guide.
- 1.4 Creating a national network of centers for innovative educational technologies.
- 1.5 Creating and timely updating a catalogue of innovative educational technologies and didactic models (algorithms represented by infographics + the lessons' video clips on the technology utilization).
- 1.6 Developing and implementing of the strategic plan named “SMART EDUCATION” in order to create a common information area for digital interaction within the university using flexible tools.
- 1.7 Introduction of amendments to the regulatory legal acts governing the activities of higher and postgraduate education organizations in terms of expanding the use of digital technologies in the organization of the educational process, including the provision of information resources, teaching aids and the development of distance learning technologies, engaging creative students and young scientists (undergraduates and doctoral students) to work in projects of HEIs' digitalization.
- 1.8 Creating a “Competence centers” including classrooms with high-performance digital equipment, laboratories, media studios and etc.; that work



experience will be broadcast on the entire system of higher and postgraduate education in Kazakhstan.

1.9 Organizing training courses for educators on the following topics:

- using interactive presentation systems;
- creating interactive, multimedia, internet connected presentations for lectures and seminars;
- implementing distance learning in real time by using:
  - interactive presentation systems;
  - video conferencing systems;
  - virtual classrooms;
- implementing distance learning at any time by using e-learning resources in:
  - text/graphic format;
  - video format;
- using cloud technology;
- introduction of augmented reality;
- applying of virtual reality;
- using drones in the learning process;
- using 3D printing for the development of didactic materials and experimental design samples;
- learning a quality predictive analysis technique based on Big Data;
- digital didactics and digital learning models.

## **2. DEVELOPING TRADITIONAL LEARNING:**

2.1 Building a reliable and fast broadband wireless internet infrastructure within all universities.

2.2 Equipping all classrooms with interactive presentation systems, including laptops when the need arises.

2.3 Equipping classrooms with interactive tables when the need arises.

2.4 Providing educational software on various disciplines.

2.5 Training educators to create and use shared cloud resources in teaching and learning processes.

2.6 Equipping all classrooms with easily moveable and flexible furnishing articles that allow for quick transformation of the seating arrangements so that the learning environment becomes better suited to a digitally supported team and project work.

2.7 Using effective digital assessment tools and feedback systems during lectures.

2.8 Equipping the common areas of universities with interactive information screens (kiosks) which provide up-to-date information, including information for public, cultural, sporting and other events.

## **3. DEVELOPING ELECTRONIC, MOBILE AND UBIQUITOUS LEARNING:**

3.1 Improving the virtual learning environment of the university – the e-learning platform.



3.2 Publishing lectures and seminars of all main courses on the e-learning platform in:

- text/graphic format;
- video format.

3.3 Creating virtual laboratories for the engineering courses.

3.4 Creating electronic interactive multimedia learning materials.

3.5 Creating of a national fund of digital educational resources (electronic interactive multimedia learning materials, virtual simulators, etc.) for HEIs of the Kazakhstan.

3.6 Digitalization the library's book fund and publishing it in the virtual library.

3.7 Developing distance learning technologies.

3.8 Developing a mobile learning.

3.9 Developing and implementing online-learning in the MOOC format (massive open online courses) for students and faculty.

#### **4. DEVELOPING BLENDED LEARNING AND ACCEPTANCE OUTCOMES OF INFORMAL TEACHING (traditional + e-learning) as the main mode of preparing specialists who possess the relevant skills required for successful functioning in the digital society.**

4.1 Development the accounting and credit transfer mechanisms, acceptance educational outcomes and alternative certification through MOOC-platforms of highly rated universities for blended learning (Top 600 according to QS or THE) and certification courses for world-class IT vendors.

4.2 Raising of the status of educator – author of digital educational resources (MOOCs, virtual laboratories, interactive simulators and etc.) highly-demanded at the country level.

#### **5. IMPLEMENTATING OTHER INNOVATIVE EDUCATIONAL TECHNOLOGIES:**

5.1 Using smartphones in education and transforming them into virtual personal assistants of the students.

5.2 Using social networks in the teaching and learning process.

5.3 Learning in networks.

5.4 Gamification of the teaching and learning process.

5.5 Using Internet of Things (IoT) in the teaching and learning process.

5.6 Using Internet of Everything (IoE) in the teaching and learning process.

5.7 Using robots in the teaching and learning process:

- as objects of control;
- as teacher's assistants.

5.8 Using artificial intelligence in the teaching and learning process.

5.9 Using drones in the teaching and learning process.

5.10 Online control of the physical activity and health of students.

5.11 Creating training companies in universities.

5.12 Creating conditions for giving universities the status of innovative Smart University.

5.13 Creating a virtual university.



## **6. IMPLEMENTING INNOVATIVE EDUCATIONAL TECHNOLOGIES IN THE TEACHING OF STUDENTS WITH SPECIAL EDUCATIONAL NEEDS**

6.1 Creating interactive educational tools for students with special educational needs.

6.2 Developing an e-learning platform for students with special educational needs.

6.3 Training educators for integrating specialized methods and tools for students with special educational needs.

## **7. IMPLEMENTING INNOVATIVE EDUCATIONAL TECHNOLOGIES TO ATTRACT STUDENTS FROM ALL OVER THE WORLD:**

7.1 Improving the methodological and technical qualities of MOOC based on digital didactic models.

7.2 MOOC – as means of mass content delivery, means of students employment and monetization of learning services.

7.3 Develop a mechanism for a national subscription to a world-class content management and training system for providing equal conditions for all universities in Kazakhstan (for example, CANVAS (American MOOC platform and LMS Canvas)).

## **8. IMPLEMENTING INNOVATIVE DIDACTIC MODELS:**

8.1 Converting traditional didactic models into innovative models through the use of innovative educational technologies.

8.2 Applying the “Flipped Classroom” model.

## **9. INTEGRATING RESEARCH-BASED PRACTICES IN EDUCATION**

9.1 Implementing highest complexity digitalization tools such as digital analytics based on Big Data technologies, Blockchain, Artificial Intelligence, Data Science in the educational process.

9.2. Continuing and expanding university subscriptions for the use of world electronic educational resources, including electronic libraries, databases, laboratory work protocols, etc.

## **10. ANALYSING THE RESULTS FROM THE IMPLEMENTATION OF INNOVATIVE EDUCATIONAL TECHNOLOGIES AND DIDACTIC MODELS**

10.1 Developing digital education indexes, to provide reliable and valid measurement of implementation of digital transformations at higher education. The purpose of the index is to ensure healthy competition between HEIs.

10.2 Developing a metrological standard for the quantitative and qualitative assessment of digital content and digital skills of faculty and university staff.

## **11. PROMOTING AND MULTIPLYING RESULTS AND GOOD PRACTICES through:**

11.1 The media.

11.2 Regional and national workshops.



- 11.3 National and international conferences.
- 11.4 Social networks.
- 11.5 National network of centers for innovative educational technologies.
- 11.6 Hackathons.
- 11.7 IT-club.
- 11.8 Start-up projects.

## UNITS RESPONSIBLE FOR THE IMPLEMENTATION OF THE ACTION PLAN:

### ➤ At national level:

- The Ministry of Education and Science;
- The Ministry of Digital Development, Defense and Aerospace Industry of the Republic of Kazakhstan;
- The Ministry of Finance.

### ➤ At the regional level:

- Rectors of universities;
- Heads of structural units;
- Digitalization offices;
- Deans of faculties;
- Heads of departments.

## FUNDING

- From projects under regional, national and international programmes;
- From donations, endowment funds;
- From the university budget.





## ADDITION:

**What digital skills and competences should be adopted by educators in order to facilitate and mainstream the digital transformation of education?**

**1. In the field of traditional learning:**

- using of an interactive board / interactive monitor;
- making of interactive, multimedia, internet connected presentations for lectures.

**2. In the field of synchronous distance learning (in real time):**

- using of a videoconferencing;
- using of a virtual classroom.

**3. In the field of asynchronous distance learning (at any time):**

- creating and publishing of interactive multimedia study materials in internet;
- recording and publishing of video-lectures in the internet;
- using of a cloud technology.

**4. In the field of blended learning:** combining of a traditional learning and e-learning in the most appropriate way to ensure maximum effect.





## GLOSSARY

**Augmented reality** is a technology that adds digital information (images, video, text, graphics, 3D models, etc.) to the physical environment, to the images or objects in the real world.

**Blended learning** is a teaching method that combines traditional intramural and online learning. Online learning provides students with greater flexibility in customizing learning through some elements of student control place, time and pace of interaction with learning content.

**Cloud technologies** (or cloud computing) are distributed digital data processing technologies that provide computer resources to the Internet user as an online service.

**Didactic teaching model** is an appearance model of the teaching process, which includes forms, methods, means of instructions, organization of teaching and the school community interaction. The model structure and the logical connections are proved and presented in different ways, such as “tree”, “concentric circles”, “spirals”, “stages”, etc.

**Digital didactics** is a science of learning, which provides a rationale for its content, methods and means, and the organization of the learning process in a digital society.

**Flipped Classroom** is a learning strategy that inverts the traditional learning environment: what is normally done in class and what is normally done as homework is flipped. A principle of the flipped classroom is that work typically done as homework is undertaken in class with the guidance of the teacher.

**Gamification** is an application of game principles and mechanics in a learning environment to increase motivation and engagement in learning.

**Innovative educational technologies** is purposeful, systematic and consistent implementation of innovative methods, pedagogical actions and means, that cover a holistic educational process from setting goals to expected results.

**Interactive table** is an interactive surface, equipped with a high-resolution touch screen, with the functions of a modern computer.

**Internet of everything** is a common interrelated system, covering people, data, processes and things, the aim of which is to convert information into actions, improve experience and make data-based decisions.

**Internet of Things (IoT)** is a network of things with sensors or chips which are connected to the Internet and interact with the real world.



**Mobile learning** is a learning using mobile technologies and devices, such as portable computers, tablets and smartphones for supporting the teaching and learning process. Access to educational resources can be provided anywhere and at any time.

**MOOC (massive open online courses)** is an online course having large participant numbers and aimed at unlimited participation by opening an access via the web.

**Smart education** is a smart learning environment, involving an effective and efficient interaction of pedagogy, technology and their fusion merging to improve learning processes.

**Virtual classroom** – is an online learning environment that allows teachers and students to communicate, interact, collaborate, explain the ideas and to use learning resources working in groups.

**Virtual laboratory** is an interactive environment for creating and conducting simulation tests which is a platform for experiments. It consists of domain-specific modeling programs, experimental blocks called objects that span data files of the tools that work with these objects.

**Virtual library** is the digital resource collections in online access via the Internet.

**Virtual reality** is an artificial environment that ensures immersion in the digital simulation of the world in which users can manipulate objects and interact with the environment.

**Virtual university** is a model of university in a virtual educational space, i.e. multi-service cross-platform application that provides all kinds of educational services.