Man In India, 97 (22) : 157-166

FORESIGHT REQUIREMENTS TO THE TEACHER ON THE VERGE OF COGNITIVE REVOLUTION

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Abstract: Nanotechnologies, biotechnologies, IT as well as cognitive technologies are rapidly becoming part of our life. Cognitive science investigates the ways in which man perceives the world, the peculiarities of the thinking process and memorizing. Hundreds of laboratories around the world use computer systems capable of reading human thoughts. The purpose of research is to justify the educational technologies that contribute to the integration of Foresight competences in the educational activity of the future teacher on the verge of the cognitive revolution.

Education is becoming more flexible, interactive and personified. A modern teacher should go ahead of his time. So as foresight consists in determining the position in reference to the future it is necessary to define foresight requirements which the teacher is expected to meet. Education of the future should have an open structure and a practice-oriented content. It should be characterized by the learners' involvement in the process of constructing future, their mobility and active position. We put forward some educational technologies aimed at preparing the teacher who is able to work in the conditions of constant education transformation. E-learning became the starting point in this process. It should be followed by smart-education as network cooperation of educational institutions with other universities, secondary schools, companies in working together in the internet sharing technologies.

To provide for the foresight requirements it is possible only through training teachers to make the foresight of the competencies in a changing world. Creating the necessary educational environment with the help of the technologies suggested in this paper will enable the teacher to reach the level of foresight requirements.

Keywords: Learner, teacher, cognitive revolution, smart education, a diary of competence growth, *e*-learning, *e*-portfolio, foresight competencies, foresight demands, new integrated environment and learning.

INTRODUCTION

Nano, bio, info, cogno technologies are being introduced with great force in the human world. Even today, there is an integration of human and machine intelligence. The man is inextricably linked with cognitive technologies. "Cognitio" is Latin for knowledge. Cognitive science studies how people perceive the world, how they think, what they pay attention to, how they store information. On the basis of its discoveries cognitive technologies are constructed, *i.e*. devices, which take into account the condition of the person and are sensitive to his or her attention, and even watching the work of the human brain. Currently, hundreds of laboratories around the world use computer systems that have an ability to read human thoughts. There is a human integration with IT devices, primarily the penetration of smart technologies

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in all the spheres of human activity, including the cognitive revolution. In the conditions of the cognitive revolution it becomes possible for a man to study at any moment and at every place, and as a result, this leads to blurring of the boundaries between human environments and learning environment (Elena M. Lyubimova et al., 2015; Ljubimova, E.M., Galimullina, E.Z., 2013; Sharafeeva L.R., 2016).

For the first time Moscow School of Management in Russia "Skolkovo" and the Agency for Strategic Initiatives conducted a large-scale study "Foresight Competence 2030", part of which became Foresight "Education 2030".

In the process of the analysis of Foresight "Education 2030" we have identified the following technologies that affect new integrated environment and learning:

All in network is an expansion of the universal wireless access, providing everyone with a minimum of free internet access through mobile devices.

The Point of God is any information instantly available and any action you can take from any point on Earth at any time.

The sixth feeling means gestures, projections and management technology which enable people to get rid of portable display devices. New principles in the interface allow users to convert any surface interaction screens. Augmented reality provides an opportunity for overlaying any information layers. You can learn new things directly in the process of observation.

Smart environment is a development of physical interfaces and a rejection of computers as special individual objects. Any object in the physical space may be present in the network.

These technologies initiate new trends in an integrated environment and teaching process. Today we observe the process of gamification which is a mass inclusion of games and simulations in education and technological processes. The game becomes a way of life and standard of human activity.

Startups are all sorts of innovations in Edu Tech. This is not only a repository of information, but also video hosting, blogs, interactive platforms, social networks, systems of collective work of researchers etc.

Digital Story telling is a story told with the help of computer tools, comprising a mixture of a computer imagery, narration, graphics, animations, video clips and music.

Virtual practices are environments, having the effect of immersion on the basis of virtual reality systems, together with the different elements of training technologies.

Upcoming mega-university is a geographically distributed and dynamically developing open complex system composed of many components and details that allow the learner to organize an individual educational process.

Electronic mentors are digital moderators that help to build individual growth trajectory and oversee the process of following it.

E-portfolio is a tool for the demonstration and assessment of competences and personal growth (Moskovskajashkolaupravlenija “Skolkovo”iAgentstvostrategich eskihiniciativ, 2015; Galimullina Elvira G., Lyubimova Yelena M., 2015).

OBJECTIVES AND METHODS

Education becomes more plastic, up to date, interactive and personalized. The teacher is the key figure in this process. The Future Teacher is flexible, mobile, well adjusted to life. He or she must not go up with the time, but be one step ahead. Therefore, there is a need to determine the requirements of foresight to the teacher for the selection of educational technologies.

The purpose of this research is to justify the educational technologies that contribute to the integration of Foresight competences into the educational activity of the future teacher on the verge of the cognitive revolution.

The transformation of the learning environment in the near future will lead to the appearance of new areas of human activity in the educational system. Professions that are described in the results of the Foresight “Education 2030” (Moskovskajashkolaupravlenija “Skolkovo” iAgentstvostrategicheskihiniciativ, 2015) are analyzed and summarized in Table 1.

TABLE 1: NEW PROFESSIONS IN EDUCATION

New professions	*General Description*
Tutor, organizer of the project-based learning, a developer of educational trajectories, ecologist	Expert on the formation and organization of educational programs
Game-master, Game-teacher	Specialist in the organization of training on the basis of gaming methods and educational games
Moderator, mentor of startups	Specialist in the development of methods and organization of collective learning
Mind-fitness trainer	A specialist in the creation of hardware and software for training productive states of consciousness of users
Coordinator of educational online platform	Specialist in *e*-learning

As a result of the analysis it can be concluded that the main functions of the teacher of the future are creating educational environments and designing educational programs and individual trajectories of development.

RESULTS

Foresight experts of "Education 2030"came to the conclusion that there will be no need for specific professional competencies in the future. Instead, specialists will need to have skills which extend beyond the boundaries of traditional professions. We have analyzed above-profession future skills identified by the experts. They include (Moskovskajashkolaupravlenija "Skolkovo"iAgentstvostrategicheskihini ciativ, 2015):

1. Multilingualism and multiculturalism;
2. Programming IT solutions, management of complex automated systems, working with artificial intelligence;
3. Interdisciplinary communication skills (understanding of technologies, processes and the market situation in different adjacent and non-adjacent areas);
4. Ability to manage projects and processes;
5. Work in a mode of high uncertainty and rapid change of conditions of the problem (the ability to make decisions quickly, respond to changing operating conditions, the ability to allocate resources, and manage your time);
6. Ability to work with teams, groups and individuals based on their individual characteristics;
7. Systems thinking (the ability to refine complex systems and work with them).
8. Ecological thinking;
9. Ability to go in for art, a developed aesthetic taste.

On the basis of the trends based on the results of Foresight "Education 2030" additional requirements for future teachers were formulated. Tables 2, 3, and 4 depict educational technologies, which are the most suitable for the formation of the appropriate competence and available for high school teachers today:

1. Information humanism, effective management of information processes.
2. Wide range of interests and knowledge in the field of new technologies.
3. The ability to exercise foresight of one's own competences.

1. **Information humanism, effective management of information processes:** In connection with the need to handle large volumes of information humanism must be understood as ensuring the optimal ratio of physical, mental, psychological and other costs in relation to the results which are supposed to be achieved. Competencies ensuring this requirement are found in Table 2.

TABLE 2: COMPETENCIES AND EDUCATIONAL TECHNOLOGIES 1

Competences	*Educational Technology*
Readiness for the provision of information humanism in the process of *e*-portfolio and roadmap	*e*-portfolio Roadmap
Willingness to attract and organize the activities of people to more quickly achieve a particular educational purpose The ability to communicate with people, to establish informal contacts Leaning Together	Learning Together Social network
The ability to effectively use cloud technology to provide information technology humanism	Cloud technology
Willingness to analyze the possibilities, advantages and disadvantages of various educational environments	E-learning MOOC
Ability to analyze smart-tools in terms of information humanism Ability to influence the integrated environment by smart tools for the effective management of information processes	Smart

2. **A wide range of interests and knowledge in the field of new technologies:** Future teachers will not be able to exercise foresight of their professional and personal growth, without a wide range of interests in the field of new technologies, especially information, bio, nano, cogno. Competences ensuring this requirement are found in Table 3.

TABLE 3: COMPETENCES AND EDUCATIONAL TECHNOLOGIES 2

Competencies	*Educational Technology*
The ability to use new technologies in the process of creating *e*-portfolios	E-portfolio
The ability to exercise foresight of one's own competencies taking into account the prospects of the development of technologies	Self-foresight
The ability to use the new features of cloud technologies	Cloud technologies
The ability to search, analyze, critically evaluate information on new technologies.	E-learning, MOOC
The ability to study, to learn, to use the new smart technologies	Smart

3. **The ability to exercise foresight of one's own competencies :** Providing foresight requirements for the teacher is possible only through the ability of the teacher to conduct foresight of his or her competences in a constantly renewing society. Competences ensuring this requirement are found in Table 4.

TABLE 4: COMPETENCES AND EDUCATIONAL TECHNOLOGIES 3

Competencies	*Educational Technology*
The ability to analyze individual achievements. Ability to identify features of the acquisition of certain competences Increased motivation The development of goal-setting skills, forecasting, planning Development of reflection ability The ability to build up life and career	E-Portfolio
Ability to develop action plans The ability to follow a set plan of action The ability to adjust the action plan in accordance with the intermediate results	Roadmap
The capacity for self-learning and development of one's own potential	Life Long Learning
The ability to see the prospects of one's own activities The ability to understand the conditions for the formation of the future by way of entering into a variety of socio-cultural programs in a professional community and other types of communities. The ability to understand the technological basis of one's own individual development, The ability to model one's own educational and social movement	Self-foresight
The ability to learn new techniques of the foresight of one's own competences	E-Learning MOOC
The ability to use Smart-tools for the foresight	Smart

Let us correlate educational technologies of the future with the technologies that are available in the modern Russian higher education nowadays. This correlation is the key to the future of a technology (Table 5) (Galimullina E.Z., 2013; Ljubimova E.M., Galimullina E.Z., 2014; Ljubimova, E.M., Galimullina, E.Z., 2013; Ljubimova E.M., Borisov I.A., 2015).

TABLE 5: FUTURE TECHNOLOGIES AND EDUCATIONAL TECHNOLOGIES TODAY

Future Technology	*Educational Technology today*
All in the network	Social networks, *e*-learning, MOOC
God's point	God's point of learning together, Cloud technologies, *e*-learning, MOOC, startup
Sixth Sense Smart environment	Smart education, cloud computing, social networking
Foresight	Self-foresight, *e*-learning, roadmap, *e*-portfolio, cloud

DISCUSSION OF RESULTS

As a result of the analysis of the requirements the authors propose a number of educational technologies that contribute to the formation of readiness of the teacher to realization of the professional activity in the conditions of a constant transformation of education.

One of the "starting" points is the e-learning technology that helps to make the knowledge transfer process more flexible, rich and user-friendly (Ljubimova E.M. et al., 2015). The next level should be the smart education, which is understood as an association, networking of universities, schools and other organizations with the purpose of carrying out joint activities in the Internet on the basis of common interests, technologies, standards and agreements.

Massive open online courses have great opportunities for organizing such informal interactions. They ensure the implementation of connectionism by which we uniderstand a variety of approaches, the approach to learning as a process of formation of the network and decision-making, learning and knowledge as a process, not a state. Massive open online courses increase the independence and motivation of students in acquiring the skills necessary for professional work in the global digital world.

Since the teacher has to go a step ahead of time, he or she must be able to make the foresight of his or her professional growth. This, according to the authors, contributes to educational technologies such as *e*-portfolio and roadmap.

Technology "*e*-portfolio" is a way of fixing, storage and evaluation of individual achievements of students during the teaching process, which provides for tracking of one's own progress in a broad educational context, demonstrating the ability to practically apply the knowledge and skills (Galimullina E.Z., 2014).

Being based on the assessment of the level of competence and carried out with the help of an *e*-portfolio, the roadmap allows the student to plan an individual career development strategy based on the foresight of one's own competences.

We have developed the technology of the high school students' foresight of competences, which is shown in Figure 1.

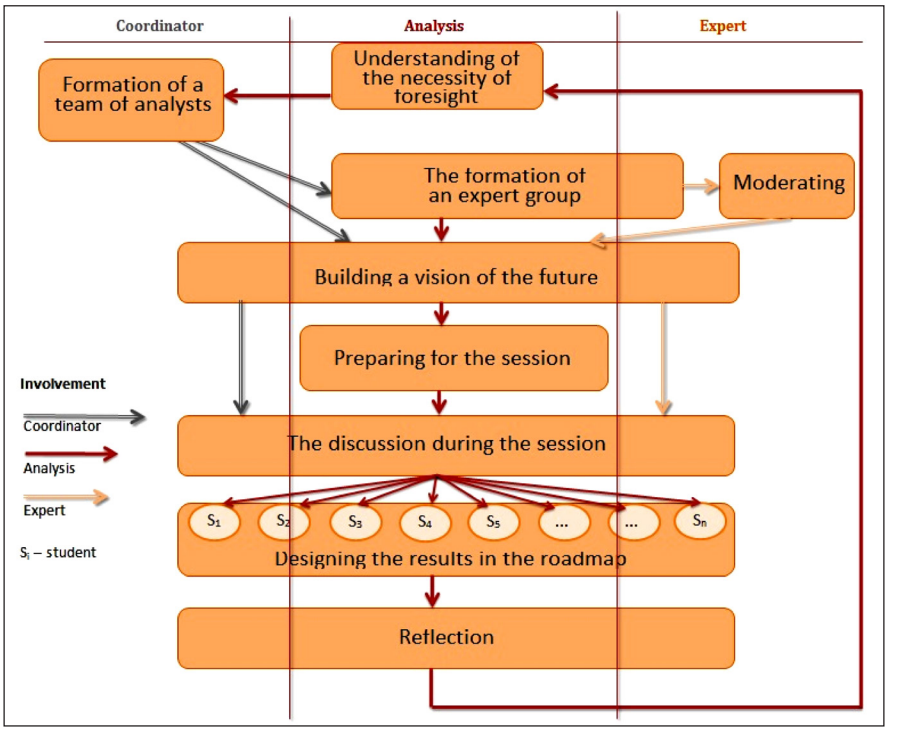

Figure 1: Technology of exercising the foresight of competences

Self-foresight technology is for working in teams. It involves such participants as a team of students who work as a group of analysts; a high school teacher who acts as a coordinator; an expert group formed in space, without limitation, using the network tools in the internet, previous participants and developed criteria.

The technology begins with understanding by the student of his or her foresight and is iterative in nature. Control lines show the sequence and degree of participation in the groups described in self-foresight.

SUMMARY AND CONCLUSIONS

The investigation introduced the concept of a new integrated development environment that implements the education of lifelong learning. Certain main trends on the basis of which new foresight requirements for the teacher are worked out have been revealed: information humanism, effective management of information processes; a wide range of interests and knowledge in the field of new technologies; ability to exercise foresight of one's own competences. The authors also formulated

competences which are based on the requirements. Having analyzed competences we have defined educational technologies available to the teachers in higher education nowadays.

Proposed by the authors the technology of making self-foresight of competences represents the process of integration of the future teacher's self-foresight into educational activities.

The results may be used by high school teachers for modeling the education process, the selection of the most relevant educational technologies for advanced development of teacher professional competencies in the system of continuous pedagogical education.

Educational technologies being based on the foresight of the future teachers of their competences enable to create «the formation of a full life cycle education» or learning together. Effective modeling of learning environments with the use of the proposed educational technologies will give the teacher an opportunity to reach the next level, the relevant requirements of foresight in the conditions of cognitive revolution.

ACKNOWLEDGMENT

The work is performed according to the Russian Government Program of Competitive Growth of Kazan Federal University.

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