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for Information Technologies  
in Education

# COMPARATIVE ANALYSIS OF TEACHER TRAINING PROGRAMMES IMPLEMENTED IN RUSSIA FOR COMPLIANCE WITH UNESCO ICT-CFT

Final report

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The final report contains the results of an analytical study of the teacher training Programmes implementating in the Russian Federation for compliance with the UNESCO ICT Competecy Framework of Teachers (UNESCO ICT-CFT)

The views expressed by the authors of this publication are their own and not necessarily those of UNESCO Secretariat.

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## ABSTRACT

This report presents the results of an analytical study undertaken to assess the compliance of teacher training programmes and courses with UNESCO ICT Competency Framework for Teachers (UNESCO ICT-CFT).

The study was particularly focused on the programmes of ICT vendors (including interactive technologies providers), professional development institutions, universities, vocational, and other education institutions.

In addition, the study:

- reviewed and classified teacher training and professional development programmes;
- identified problems of the research and developed a general assessment method of training programmes;
- carried out an assessment of training programmes for their compliance with UNESCO ICT-CFT; and,
- suggested approaches for the improvement of training programmes and their modification to meet the UNESCO ICT-CFT recommendations.

## ABBREVIATIONS

AP KIT	Information & Computer Technologies Industry Association
CPE	Additional professional education
DE	Distance education, e-learning
EI	Educational Institution
EMC	Educational and Methodological Council
EMU	Education and Methodology Union
EQF	The European Qualifications Framework
FSES	Federal State education standards
FSR	Federal state requirements
HE	Higher education
ICT	Information and Communication Technologies
ICT-CFT	UNESCO ICT Competency Framework for Teachers (ICT-CFT)
ISRB	The integrated skills reference book of executives, specialists and employees
IT	Information Technologies
LC	Life cycle
MAC ICT	ICT Multivendor and Academic Consortium
MEP	Main Educational Programme – a set of instructional documents regulating goals, expected results, content and implementation of the education process in certain area (specialty) of HE
NQF; NQF RF	National Qualifications Framework of the Russian Federation
OKOP	All-Russian Classifier of education programmes
OKPDTR	Of workers' and employees' occupations and wage grades
OKSO	All-Russian Classifier of Professions in Education
OKVED	All-Russian Classifier of Types of Economic Activity
OKZ	All-Russian Classifier of Occupations
PS	Professional Standard
QR	Qualifying Requirements
RUIE	Russian Union of Industrialists and Entrepreneurs
SES	State educational standard
SVE	Secondary vocational education
TTI	Teacher training institutions
UNESCO IITE	UNESCO Institute for Information Technologies in Education
ETKC	Integrated wage-rates and skills reference guide of workers

## Introduction

Today, students around the world widely use information and communication technologies (ICT) for everyday communication, creative work, and information exchange, so they expect to be able to do the same in their education environment. However, educators need support in understanding when and how to use ICT in the learning process to be able to find a common language with their students, and to share their experience and knowledge.

As it is mentioned in the UNESCO IITE Policy Brief “ICTs and Teacher Competence” (October 2011), the goal of ICT initiatives in schools is not simply to use ICTs more effectively in teaching; rather, the goal is to impact and improve economic development at many levels through the use of ICTs.”

One of the important lessons of the past decades has been that the use of ICTs in education is a multifaceted process involving teacher competence requirements, teaching materials, ICT tools, and daily work of students and teachers. This process is also connected with a national policies and the level of socio-economic development.

In this regard, UNESCO, as a result of successful continued cooperation with CISCO, INTEL, ISTE, and Microsoft, and using recommendations of ICTs in education specialists around the world, has developed the **ICT Competency Framework for Teachers**, or **ICT-CFT**, which aims to help countries develop comprehensive national ICT competency policies and standards for teachers.

However, the existence of rules and standards for teachers' ICT competence is not sufficient to produce necessary changes. The most important element in school reform and effective implementation of ICTs is continuous professional development and training of teachers.

Taking into account the above-mentioned factors, UNESCO IITE initiated research aimed to analyse the state-of-the-art in teacher ICT competence and to develop recommendations on the use of ICT-CFT. The Russian Federation was chosen as a pilot region, as the use of ICTs in Russian education is an actively ongoing process.

The research was focused on educational and training programmes, courses, and initiatives of:

- ICT vendors producing modern hardware and software
- Professional development and retraining institutions
- Institutions of higher education, secondary vocational education, and other educational settings

### **Aims and goals of the project**

*The aim of the project* is to assess teacher training programmes for compliance with UNESCO ICT-CFT.

*The goals of the project* are the following:

- Review and classify teacher training programmes in the area of ICTs
- Develop a methodology of assessment and analyse existing teacher training programmes

- Assess teacher training programmes for their compliance with UNESCO ICT-CFT
- Work out approaches to improve training programmes to meet ICT-CFT requirements

### **Practical use and application of the Project results**

The Project results will be recommended to be used by the Ministry of Education and Science of the Russian Federation, regional education authorities of constituents of the Russian Federation, and education institutions implementing the programmes of professional development of education personnel – IT vendors, professional training and retraining institutions, universities, secondary vocational institutions, etc.

The results will provide mechanisms to bring training programs for education personnel to conformity with the international UNESCO ICT-CFT requirements.

### **Structure of the report**

The present document is a result of the Project “Comparative analysis of teacher training programmes for compliance with UNESCO ICT-CFT recommendations” and is designed both for project participants and, by extension, all stakeholders.



After the present introduction, the document has four main sections. Section 1 provides an overview and classification of training programmes for professional development of school and higher education educators. Section 2 describes approaches and a generalized evaluation method of training programmes. Section 3 carries out an assessment of training programmes for compliance with UNESCO ICT-CFT. Special attention is paid to the analysis of the federal state education standards (FSES) in higher education. Finally, the conclusion summarizes the main results of the work and discusses approaches for improving the programmes to meet UNESCO ICT-CFT recommendations.

# 1. Review and classification of teacher training programmes

## 1.1 Classification of teacher training programmes

In Russia there are a great number of training programmes for professional development of education personnel of higher and secondary schools in the field of ICT. They can be divided into three groups:

- *Programmes of state education institutions*
  - Education and training of education personnel within the system of secondary vocational education (SVE)
  - Education and training of education personnel within the system of higher education (HE) (bachelor's, master's and specialist degree programmes)
  - Further training, retraining, and acquiring of additional qualifications within the system of Additional Professional Education (APE)<sup>1</sup>
- *Programmes of commercial organizations and private education centres*
  - Technology courses of IT-vendors, aimed at the study of a concrete software or hardware product
  - Basic ICT literacy courses, which are often not connected or only slightly connected with any particular vendor's develop-

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1) Nowadays the new Federal Law "On Education" suggests big changes in APE system. The study was conducted before the mentioned Law was accepted.

ments

- Project-based education suggested by a distributor who provides specialized ICTs for education (such as interactive hardware or software) and organization of education processes (systems of distance learning, management information systems in HE institutions, etc.)

- *Joint programmes/projects of state and commercial institutions*

These programmes can also be divided by the target audience:

- *Teacher training programmes*, which take into account the specific character of pedagogical activities, and contain corresponding examples and instructions
- *Programmes for technical staff and end users*, who leverage certain ICTs without reference to teaching

It also should be noted that some ICT vendors do not suggest any special training for teachers and educators, but provide training and methodological materials containing recommendations on the organization of education process, guidelines, best practices, and other documents. These materials allow educators to acquire necessary competence by themselves, sometimes spontaneously, and take up modern pedagogical practices.

In addition, we should mention the important role of specialized conferences, open educational resources, and education community forums (such as "In-

novative Teachers Network,” <http://www.it-n.ru>) where teachers share their experiences, best teaching practices, and conduct mini-courses and workshops.

### **1.1.1 Teacher training programmes within the systems of secondary vocational and higher education**

In September 2011, Russia accepted Federal State Education Standards (FSES) for HE and SVE, which form the basis for enrolment of new students. It defines areas of professional specialization, among which the major group EDUCATION AND PEDAGOGY 050000 is of particular interest to us. Within HE, it is represented by the following specialties, with corresponding bachelor’s and master’s programmes:

- 050100 – Pedagogical education
- 050400 – Psychological and pedagogical education
- 050700 - Special (defectological) education
- 051000 – Professional education (by subject area)

There is also a specialist’s programme:

- 050407 – Pedagogy and psychology of deviant behaviour.

Within the SVE system, the major group EDUCATION AND PEDAGOGY 050000 includes the following specialties:

- 050130 – Music education
- 050139 – Fine arts and drawing
- 050141 – Physical culture
- 050142 – Adaptive physical culture
- 050144 – Early childhood education

- 050146 – Primary school teaching
- 050148 – Pedagogy of additional education
- 050710 – Special needs early childhood education
- 050715 – Pedagogy of special needs primary education
- 051001 – Professional education (by subject area).

### 1.1.2 APE programmes

Regulatory documents currently in force in the Russian Federation specify the following types of APE programmes<sup>1</sup>:

- ***(Further) Professional training***
  - Short-term further training with the issuance of a certificate (72 to 100 hours)
  - Middle-term training with the issuance of a certificate (100 to 500 hours)
- ***Professional retraining***
  - Professional retraining with the issuance of a diploma, giving the right (according to a qualification) to carry out new type of professional activity (over 500 hours, no upper limit)
  - APE programme with assignment of additional qualification, with a diploma granted in addition to the higher education (over 1000 hours, in accordance with determined standards)
- ***Internship***

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<sup>1</sup> The new Law “On Education” changes the APE structure slightly by introducing new rules and mechanisms for acquiring additional qualifications.

Professional retraining of specialists is a separate type of APE, which is conducted taking into account the profile of education earlier obtained. It is implemented by institutions of professional training and retraining, as well as by departments of HE or SVE institutions. These programmes are of two types:

- programmes that improve the knowledge of specialists to perform a new type of professional activity on the basis of established qualification requirements for specific professions or positions
- programmes that provide additional qualification and are composed in accordance with federal state requirements for minimum content and the level of requirements for specialists to obtain additional qualification

Retraining programmes for the performance of a new type of professional activity are created by education institutions when they are licensed.

APE programmes for obtaining additional qualifications are formed at the request of the ministries, departments, and government education authorities.

Internships provide real-world practice for the professional knowledge and skills acquired through theoretical training; they facilitate the study of best practices and the acquisition of professional and organizational skills for new professional duties.

Internships can be held in enterprises, leading research institutions, education institutions, consulting companies, or executive agencies, both in the Russian Federation and abroad. After the internship a student is granted a certificate of professional training depending on the number of hours of internship.

**List of approved additional qualifications in the area of pedagogy and education:**

- Teacher
- Higher Education Teacher
- Higher Education Manager (by type of specialization)
- Education Manager (for heads of pre-school educational settings and institutions of general education)
- Education Manager (for Federal and municipal education authorities)

**1.1.3 Training programmes and courses of ICT vendors**

Most of the big local and foreign ICT vendors develop and support programmes and individual courses for the education system, which can be divided into the following groups:

- **V<sub>1</sub>**: basic computer literacy and technological competency courses for educators, as well as advanced courses on the use of ICTs in education; e.g., *Intel® Teach to the Future* Programme
- **V<sub>2</sub>**: training courses for schools/universities delivered in the “academic mode” during the semester; e.g., Cisco Networking Academy courses
- **V<sub>3</sub>**: specialized trainings, training courses, and certification programmes for trainers of training centres; e.g., Microsoft Certified Trainer (MCT) programme
- **V<sub>4</sub>**: education methodological complexes to support technological training courses and designed for students of training centres

- V<sub>5</sub>: technology courses to train in the use of certain ICTs and provided in the education system on free or concessional terms; typically, linked to industrial certification
- V<sub>6</sub>: specialized courses for the heads of education institutions

## **1.2 Review of training programmes for teacher training and professional development**

### **1.2.1 Microsoft training programmes**

Microsoft implements a large number of educational projects intended for school teachers, university professors, and educators of other levels. The largest among them are the following:

#### **Microsoft ‘Partners in Learning’ programme**

This programme is a long-term Microsoft initiative aiming to provide the education community (school teachers, students, methodologists, school principals) with additional opportunities and resources for effective learning and incorporating technologies into the learning process. It includes a number of sub-programmes (projects and education initiatives)

- IT Academy for Teachers Training
- Teacher training within the System of continuous self-defined professional development of educators, developed by Microsoft on the basis of UNESCO ICT-CFT
- “Innovative Teachers Network” portal – one of the most popular online communities in Russia for teachers who are keen on the use of information technologies in their professional activities, with more than



70,000 active users of the portal [www.it-n.ru](http://www.it-n.ru), over 27,000 instruction support materials available, trainings, communication and exchange of experience on pressing teaching issues

- Global educators network at ‘Partners in learning’ portal
- School Research to measure and develop 21st century teaching and learning skills
- [\*Microsoft Innovative School Program\*](#), the project to support innovations in school development.

**Teacher training within the System of continuous self-defined professional development of educators, elaborated by Microsoft on the basis of UNESCO standards**

The System of continuous self-defined professional development of educators (SCSDPDE) was created by Microsoft based on the UNESCO project for the development, formulation, and approval of ICT competence framework (ICT-CFT), with the objective of having modern educators working in a modern ICT-enhanced environment<sup>2</sup>.

The Microsoft SCSDPDE starts with a 40-question entrance test. Based on the results, the system assigns each user the mandatory and optional training courses to pass online at an easy pace (self-defined learning path).

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<sup>2</sup> The UNESCO ICT Competency Framework for Teachers is available at <http://iite.unesco.org/publications/3214694/>

The programme has 40 training modules within six courses, which cover various aspects of a teacher's activities, such as evaluation; pedagogical practices; organization of learning in pairs, groups, or individual mode; extracurricular work; professional development; etc. The average time for completing the whole programme is about 30 hours; the courses are available through the Internet.

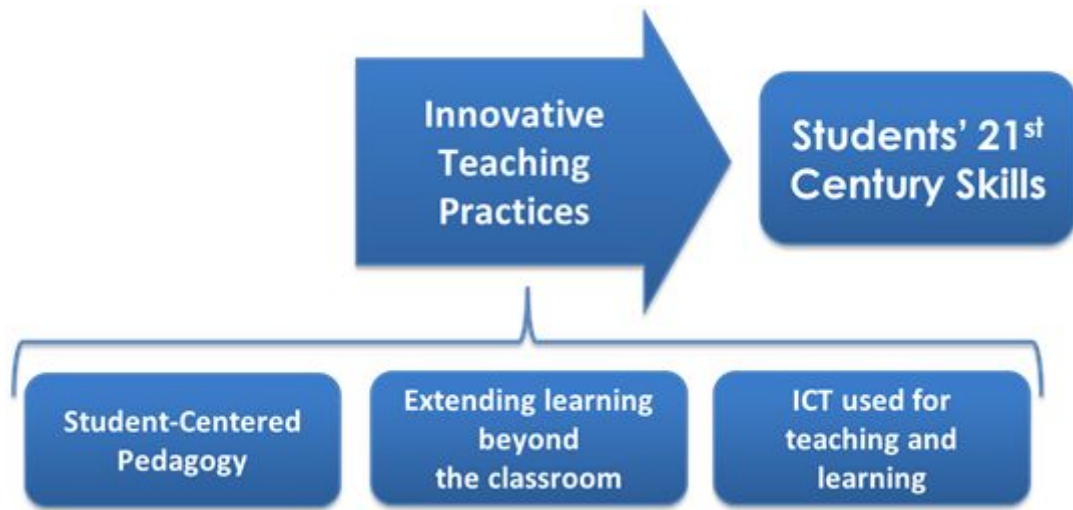
At the end of each course, a trainee is evaluated. In case of successful online testing (over 80% of correct answers), the trainee is granted a certificate that contains a trainee's personal portfolio in the System. In addition, since 2012, the teachers who have passed the SCSDPDE training can take **face-to-face testing** in authorized Microsoft testing centres for the 'Microsoft Certified Educator' certificate.

According to Microsoft, the System may become a prototype of regional training programmes that are developed using advanced trends in education and on the basis of new education standards.

### **Microsoft Partners in Learning School Research to measure 21st Century teaching and learning skills**

*Microsoft Partners in Learning School Research* is based on the principles of the international research project *Innovative Teaching and Learning Research* (ITL Research). Its goal is to provide schools with a system that defines and measures innovative teaching. It helps school personnel monitor how innovative teaching practices are emerging over time within their schools.

The ITL Research model contains three core elements of innovative teaching practices, shown on figure 1.1.



**Figure 1.1 – Innovative Teaching Practices**

Each of the three elements of innovative teaching practices are explored and measured separately in the Partners in Learning School Research Surveys.<sup>3</sup>

Participation in the study provides schools with:

- measures of innovative teaching and learning practices specific to them.
- a comparison of school leaders' and educators' perspectives on these practices.
- opportunities to examine their scores relative other schools in their region or country.
- insight into how to make technology investments more effective for student learning.
- data to guide educator professional development and school investment decisions.
- examples of innovative teaching practices.

<sup>3</sup> Details and definitions of these concepts are available at [www.itlresearch.com](http://www.itlresearch.com).

- a baseline for a common dialogue among educators, parents, students and other community stakeholders about transforming teaching and learning practices.

Figure 1.2 presents an example report on a study conducted in a Russian school – the answer to the question “To what extent do you find the following to be barriers to using ICT in your target class?”

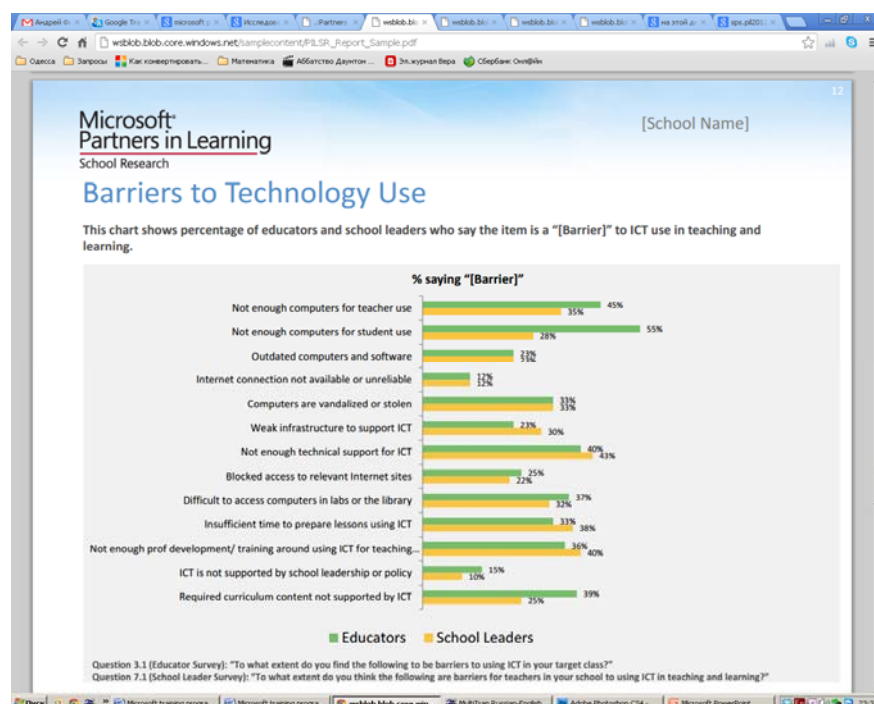


Figure 1.2 – Sample question from a report

**Microsoft Innovative School Program to support schools innovative development**

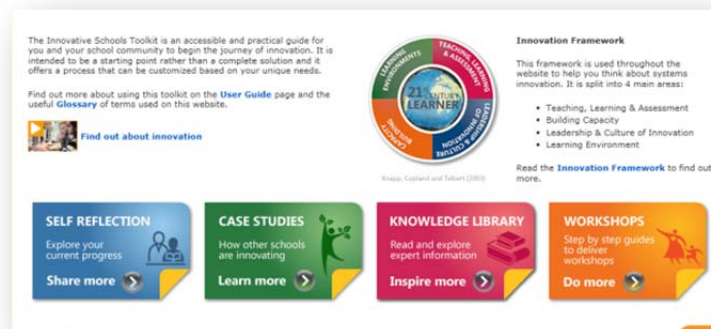
The Microsoft Partners in Learning “Innovative School Program” works with communities of schools, united by a common desire to transform education.



**Figure 1.3 – FIGURE TITLE**

The purpose of the program is to help schools and education communities throughout the world go successfully through the transformation process, providing model solutions and detailed plans for their implementation. The program provides the guidance, which helps education institution to move forward confidently.

The Program suggests to all its members an Innovative School Toolkit, which helps schools define the area of innovation, design solutions to meet the schools’ unique needs, and share their experience with others (see figure 4). The Toolkit includes:



**Figure 1.4 – Innovative School Toolkit**

- Online instruments for self-assessment and reflection
- Case studies describing successful innovative practices from the program’s members experience
- A knowledge library containing about three dozens of carefully selected materials, prepared by leading world experts in the field of school reforming
- Workshops and consultations by recognized international experts, as well as materials that can be used in pedagogical and technological workshops in schools

### **Global educators network at the ‘Partners in learning’ portal**

The “Partners in learning” portal ([www.pil-network.com](http://www.pil-network.com)) is a network for teachers, created by teachers, and supported by practicing teachers. The portal provides access to free educational software for online and off-line professional development. It is also a platform for educators to discuss new educational technologies, share experiences, and present their own successful models of classroom work, extracurricular work, and school management.

The portal unites over 4 million registered users from 115 countries and who speak 36 different languages. Microsoft Translator Services automatically translates text materials into users' native language.

Users' dynamic personal and professional profile can be integrated with the user's personal blog, Facebook, or Twitter.

The site features over 20 free software applications and a daily updated collection of educational materials in various formats: video, presentations, text, PDF, etc.

## 1.2.2 Kaspersky Lab training programmes

The screenshot displays the Kaspersky Lab website interface. At the top, there are three main sections: 'Учебники' (Textbooks), 'Бесплатные инструменты' (Free tools), and social media links for Twitter and Facebook. Below these are several featured articles and resources, including interactive lessons on mouse safety, Microsoft learning resources, and Windows Live SkyDrive. A search bar is visible, and the results section shows two search results in English, such as 'Трёхмерные поверхностные диаграммы в Excel (Office 2007)' and 'Основы использования OneNote в классе'.

Figures 1.5 and 1.6 – Kaspersky Lab

Kaspersky Lab provides teacher training on information security basics within the "Kaspersky Academy" programme in the following forms:

- Webinars (remote seminars)
- Face-to-face seminars
- Self-training using the materials of their web site<sup>4</sup>

**Webinars.** Online meetings with a duration between 30 minutes and three hours. During the meeting, the lecturer explains student the basic principles of information security, demonstrates modern protection against computer threats, and shows how to treat or remove malware. At the end of the course, students are encouraged to use this knowledge in their professional activities. Some courses include laboratory work and tests, which are offered to trainees for final evaluation. After the seminar, participants receive a certificate from the company.

*Themes of the webinars:*

- Online training for educators “Basics of computer security”, 6 hours
- Modern computer threats, 2 hours
- Modern mobile threats, 1 hour
- Financial information security, 2 hours
- Change over to Linux: the pros and cons of Kaspersky Anti-Virus for Linux File Server, 2 hours
- New features of Kaspersky Anti-Virus for Windows Workstation, 2 hours
- Malware for Non-Windows platforms, 1 hour
- Social networking security, 0.5 hours
- Computer threats: classification and history, 2 hours
- Spam: how it appears, spreads and ways to prevent it, 1 hour

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<sup>4</sup> Kaspersky Academy web site, <http://academy.kaspersky.com/index.html>



- Intellectual property, 1 hour
- Information Security Lesson, 1 hour

The geographical scope of the webinars is the Russian Federation and CIS States. The Central and Siberian Federal regions are the most active. The number of participants of one webinar is 30-40 people. In total, over 1.5 thousand participants have been trained – 48% were school teachers (66% of whom were teachers of science and ICT) and 27% were university professors.

**Face-to-face seminars.** These are meetings with school teachers and university professors within the one-day seminar “Information security day,” aimed at updating participants’ knowledge in the field of information security, and exploring new trends and the current situation in the world of computer threats. The duration of the meeting is 2-3 hours, and the number of participants can be 100 and more.

*Issues:*

- Modern computer threats
- Modern anti-virus technologies;
- Classification of malware
- Social networking threats
- Software and intellectual property

The total number of participants since 2005 has exceeded 8.7 thousand people. The regions covered have been Moscow and Moscow region, Saratov, Samara region, Tver Region, Republic of Tatarstan, Omsk region, Novosibirsk region,

Tomsk, Transbaikalia territory, Astrakhan region, Republic of Karelia, Leningrad Region, Perm region, Krasnodar, etc.

**Materials for self-learning.** Kaspersky Academy provides for its students free access to webinar presentations and recordings, instructions, and brochures concerning information security. The following training courses are also available for free:

- Basics of computer security, 16 hours + labs
- Computer threats: methods of detection and analysis, 32 hours + labs
- ABC of information security, 1-5 school grades, a part of EMC “The basics of information protection, 1-11 grades,” + labs

In total, over 1,5 thousand of institutions participate in Kaspersky Lab’s training initiatives in Russia and CIS, and over 100 abroad.

In addition to training teachers, the Kaspersky Academy programme invites participants to take part in competitions aimed at getting practical use of the knowledge obtained. Contests of various subjects and focuses are united by one theme: information security. The format varies from written essays to computer games, songs and videos. Since the programme started, over 24,000 people attended competitions and 900,000 were awarded diplomas and prizes (1–3 places).

### **1.2.3 Intel training programmes**

Intel has a large number of educational projects that are mainly focused on the school education system, among them:

- *Intel® Teach to the Future* programme, which helps teachers to effectively use the newest information and education technologies to teach students key competencies based on 21st century values, knowledge, and skills
- *Intel® Learn Programme*, which includes training courses built on educational technologies of critical thinking, collaborative learning, and project-based activities
- *Letopisi.Ru*, which is aimed at the creation and development of a network community of teachers in Russia and CIS for implementation of network projects together with their students

**Intel® Teach to the Future** is a worldwide programme of teacher professional development that now covers more than 5 million teachers in 40 countries worldwide, and their number is constantly growing.

The programme is designed to help teachers master the newest information and education technologies, and to expand their use in the classroom, in their training materials, in project work, and in students' independent research.

The main idea of the Programme is to effectively integrate information and education technology into the classroom in order to develop students' key competencies based on the 21st century values, knowledge, and skills.

#### *Training models*

Trainees can choose a training course in accordance with their needs from the range of courses offered by the Program today. School teachers trained within the Intel® Teach to the Future Programme can participate in additional methodo-

logical workshops, obtain a tutor's certificate, and continue working with their colleagues at "school educational platforms". The training is free of charge; each trainee is given a CD-ROM with a textbook; a certificate is issued after successful completion of the course.

Annually, the programme's alumni are provided with a wide spectrum of opportunities:

- Participation in all-Russian network projects and competitions for teachers and their students
- Support of participation in various Russian and international activities
- Professional training by the tutors of the Programme and others

#### *The history of the programme in Russia*

The programme was launched in Russia in November 2001 with the support of the Ministry of Education of the Russian Federation. From February 2002 to December 2010, over 700,000 people were trained on the programme, and in 2010 alone 90,000 people were trained. In July 2005, Intel signed an agreement with the Ministry of Education and Science of the Russian Federation on the support of the teacher training program for 5 years. Every year the programme gains new partners, and in 2010, the programme was hosted by 125 education centres (pedagogical universities and colleges, teacher training and retraining institutions, etc.) in 80 Russian regions. Regional authorities consider the programme one of the main teacher training programmes in their region and finance the major part of the Programme. In many regions, the Programme is suggested to school heads to be chosen for teacher professional development. Most of the institutions participating in

the programme have included the course into their state education programmes and plans.

The programme is widely recognized among the Russian education community – school teachers, university professors, TTI – and is considered one of the best teacher training programmes for mastering education technologies and their incorporation into the learning process today. The programme has received more than 200 awards and certificates from the regional offices of education.

Since 2007, a long-distance version of the Intel® Teach Program Essentials Course – Intel® Teach Essentials Online Course – has been actively implemented in the regions. The new version (version 10) of the face-to-face Intel® Teach Essentials Course was successfully introduced in 2008; the training of tutors was held in all regions of the Programme.

In 2010, the Programme launched its first self-education course, “Project-based learning,” within the "Elements" series (a fascinating series of short self-study courses). The "Project-based learning" course introduces school teachers to the method of learning by project and teaches them to practice this method in the classroom. The course consists of five training modules, introduction, and concluding part. Virtual teachers, an intuitive user interface, and interactive exercises make the learning process interesting and exciting. Trainees pass the course in a self-study mode, complete all or any of electronic tasks, and develop a plan for a project. Self-study courses can be taken off-line, using CD-ROM, or online.

### **Intel® Learn Programme**

The Intel® Learn Programme is part of a worldwide project “Innovations in Education”. The programme is currently being implemented in Brazil, Chile, China, Egypt, India, Israel, Mexico, Turkey, and Russia. It was developed to help children who don’t have permanent access to computer technologies not only acquire basic computer skills, but also skills of team-working, problem-solving, and critical thinking.

Intel® designed this programme to teach information technologies and at the same time help teachers effectively use them in the education process; it provides the possibility of student-oriented developmental education. Training on the programme raises the technological literacy of trainees, as well as teaches them how to make choices and decisions. Education technologies of critical thinking, networking, and project-based activities have been incorporated into the course to simultaneously master personality-centred teaching and team-working skills.

The Intel® Learn Programme is being implemented in Russian education institutions since 2005 and it offers three training courses:

- Technology and Community
- Technology at Work
- Technology and Entrepreneurship

Since the programme was launched, its courses have been taken by more than 150,000 students of education institutions in the Republic of Karelia, Mari El, Tatarstan, Chuvashia, and the regions of Novosibirsk, Voronezh, Vladimir, Orenburg, Pskov, Samara, Tomsk, Nizhny Novgorod, Astrakhan, and Omsk, as well as

in the cities of Moscow, St. Petersburg, Zheleznogorsk (Kursk region), Anapa (Crimea).

Education institutions of the Russian Federation implement the Intel® Learn Programme using the following organizational models:

- extra-curriculum groups
- elective courses
- specialized courses
- ICT courses for 5-7-grade students
- vacation schools and summer camps
- extra-curriculum project activities
- training courses in English
- teaching of school children by students of pedagogical institutions within their education practice
- corporate education model (training as a team of primary school teachers and all students)

#### *Main model*

The course is carried out as extra-curricular (optional) activity. In most cases, such courses are held in schools after the compulsory lessons. These sessions are not mandatory for students; their participation is up to them and their parents.

There may be different organizational forms:

- Extra-curricular groups: studies are not connected with main school curriculum, choice to enrol is free, mixed age groups, course can be attended by children from other schools

- Elective courses: optional courses for students from one class or different classes of the same school level (e.g., eight-graders); sometimes students are required to attend a certain amount of elective courses on their own choice
- Specialized (profile) courses: the courses corresponding a student's specialization (profile) at high school level; the choice to enrol is free.

### *Second model*

The course of Informatics and ICT is included into compulsory school curriculum. Since 2006 it has been fully implemented only in Chuvashia region, where it has been delivered by 24 centres. Thanks to cooperation with the Ministry of Education of Chuvash Republic, the Intel® Learn Programme has been incorporated into the Republic's school curriculum for the Informatics course for school grades 5–7.

There are plans to spread this model to other regions. The Ministry of Education of the Republic of Karelia, for instance, has prepared recommendations to include the Intel® Learn Programme into mandatory school curriculum (regional component, grades 5–6, “Students’ Educational Research Activities”, one hour per week, 32 hours per year).

### *Other models*

The third model involves holding the programme courses in vacation camps for children. Summer sites and camps are organized in regular schools; classes are taught by school teachers for children of all ages.



The fourth model sees the incorporation of programme courses into school project-based activities (15 2-hour sessions).

In 2010-2011, the fifth model of the programme, “Skills for Success,” was launched. In this model, students of pedagogical colleges (various specialties) who complete the training course are awarded a certificate of programme tutor, and start training students within their summer teaching practice.

#### **1.2.4 Training programmes of providers of interactive technologies**

In Russia there is a number of providers of specialized educational equipment, including interactive whiteboards, learning response systems, language labs, etc. These technologies promote the use and increase efficiency of new methods in education. Distributors or vendors themselves develop special training courses and create an educational environment with collections of learning content.

Here is a list of some of the companies:

- Polimedia is a supplier of interactive whiteboards of SMART Technologies Inc. and supporter of *Polymedia Club* (<http://www.edcommunity.ru/>),
- Infologics (<http://www.infologics.ru>) is a distributor of Panasonic and Hitachi interactive boards; it also holds an 8-hour practical seminar within the “Panasonic Academy for teachers” programme (<http://edu.panaboard.ru/seminars/seminarplan.htm>).

- Promethean (<http://www.prometheanplanet.ru>) produces and distributes interactive boards and holds seminars/webinars on the use of ActivInspire, software for creation of educational courses.
- RENE (<http://www.mimioclass.ru/education.htm>) supplies education institutions with DYMO/Mimio equipment and carry out training on several programmes such as “New information technologies” (the use of interactive boards), and “Mobile interactive complexes” in secondary school.
- Votum (<http://www.votum-edu.ru>) provides voting and learning response systems. No training is offered as these systems are rather easy to master.

### **Polymedia Club seminars**

Polymedia Training Centre offers seminars that allow users to master the skills required to use interactive whiteboards and create specialized content:

- Introduction to SMART Notebook: (level I and II)
- SMART Certified Interactive Teacher
- SMART Certified Lesson Developer for primary teachers
- Advanced SMART Notebook course for tutors
- Introduction to SMART Response
- Introduction to SMART Sync
- The use of SANAKO Study 1200 software complex in teaching and learning foreign languages

There are also distance courses and webinars:

- SMART Notebook Training distance course for tutors

- First steps in flash technologies
- Creating multi-page flash-application in Adobe Flash

### **1.2.5 Training programmes of the Academy of Professional Development and Retraining of Education Professionals**

The Federal State autonomous education institution “Academy of Professional Development and Retraining of Education Professionals” (APDREP) is an educational and scientific centre within the Federal system of additional professional pedagogical education. It acts as a parent organization in the sphere of professional development and retraining of educators.

APDREP implements a large number of APE programmes of various levels, including professional development in the area of ICTs; among others:

- Methodical features of systemic use of multimedia learning tools in the organization of education process
- Method of using information and communication technologies in primary school in view of the Federal State standard of primary education coming into effect
- Methods of the use and incorporation of multimedia learning tools into the education process in the light of the transition to the new education standards
- Detection methods and analysis of computer threats
- Use of innovative learning tools in the school education process
- Computer and Internet Security

- Method of using new generation of electronic educational resources (EER) in the transition to new FSES
- Teaching methodology of C++ algorithms and programming to solve the problem tasks
- Development of web-resources using the technology of web sites design in Content Management System (CMS)
- ICT-based management of education institutions
- Practical course on the use of MS EXCEL 2007 in pedagogical research

## **2. Methods of training programmes assessment**

### **2.1 ICT-CFT: Structure and key features**

UNESCO, in partnership with industry leaders and global subject experts, has created an international benchmark that sets out the competencies required to teach effectively with ICT: the UNESCO's ICT Competency Framework for Teachers (UNESCO ICT-CFT). Teachers who meet these requirements (have relevant competencies) are able to successfully implement education process in ICT-saturated learning environment.

UNESCO's Framework emphasizes that it is not enough for teachers to have ICT competencies and be able to teach them to their students. Teachers need to be able to help the students become collaborative, problem-solving, creative learners through using ICT so they will be effective citizens and members of the workforce. The Framework therefore addresses all aspects of a teacher's work:

- Understanding ICT in education
- Curriculum and assessment
- Pedagogy
- ICT
- Organization and administration
- Teacher professional learning

The Framework is arranged in three different approaches to teaching (three successive stages of a teacher's development):

- Technology Literacy, which enables students to use ICT in order to learn more efficiently

- Knowledge Deepening, which enables students to acquire in-depth knowledge of their school subjects and apply it to complex, real-world problems
- Knowledge Creation, which enables students, citizens, and the workforce they will one day become to create the new knowledge required for more harmonious, fulfilling, and prosperous societies.

THE UNESCO ICT COMPETENCY FRAMEWORK FOR TEACHERS			
	TECHNOLOGY LITERACY	KNOWLEDGE DEEPENING	KNOWLEDGE CREATION
UNDERSTANDING ICT IN EDUCATION	Policy awareness	Policy understanding	Policy innovation
CURRICULUM AND ASSESSMENT	Basic knowledge	Knowledge application	Knowledge society skills
PEDAGOGY	Integrate technology	Complex problem solving	Self management
ICT	Basic tools	Complex tools	Pervasive tools
ORGANIZATION AND ADMINISTRATION	Standard classroom	Collaborative groups	Learning organizations
TEACHER PROFESSIONAL LEARNING	Digital literacy	Manage and guide	Teacher as model learner

**Figure 2.1 – ICT-CFT key modules**

The intersection of the three approaches to learning and six education aspects define the ICT competency framework for teachers, consisting of 18 modules with the corresponding codification (TL.1 – TL.6, KD.1 – KD.6, KC.1 – KC.6).

THE FRAMEWORK			
	TECHNOLOGY LITERACY	KNOWLEDGE DEEPENING	KNOWLEDGE CREATION
UNDERSTANDING ICT IN EDUCATION	TL.1	KD.1	KC.1
CURRICULUM AND ASSESSMENT	TL.2	KD.2	KC.2
PEDAGOGY	TL.3	KD.3	KC.3
ICT	TL.4	KD.4	KC.4
ORGANIZATION AND ADMINISTRATION	TL.5	KD.5	KC.5
TEACHER PROFESSIONAL LEARNING	TL.6	KD.6	KC.6

**Figure 2.2 – ICT-CFT Framework**

The three approaches represent different stages in the use of ICT in education. The approach that a country adopts will depend on the extent to which ICT is integrated into its society, economy, and education system.

It is important to note that the modules of corresponding levels are not mutually exclusive, but rather complement each other – in the general, it is impossible to achieve a higher level, without providing a lower level first. It may cause difficulties in assessing the programmes, as their educational content may belong to different levels and modules.

The ICT-CFT contains a detailed description of each of the 18 modules along the following sections:

- Module title
- Curriculum
- Teacher competencies
- Objectives
- Example methods

For most of the modules the "Objectives" section is divided into sub-sections numbered alphabetically (a, b, c, ...), which contain more detailed indicators of the form “Teachers should be able to...” and corresponding example methods.

<b>TL.3.a.</b> Describe how didactic teaching and ICT can be used to support students' acquisition of school subject matter knowledge.	Describe how the use of ICT and specific types of software can support students' acquisition of school subject matter knowledge and demonstrate ways in which the use of this technology can supplement didactic classroom teaching (i.e., lecture and demonstration teaching).
<b>TL.3.b.</b> Incorporate appropriate ICT activities into lesson plans so as to support students' acquisition of school subject matter knowledge.	Have participants design lesson plans that incorporate tutorial and drill and practices software, and digital resources. Have participants share these plans and receive recommendations from peers.
<b>TL.3.c.</b> Use presentation software and digital resources to support instruction.	Demonstrate the use of presentation software and other digital media to supplement a lecture; provide a variety of examples of instructional presentations; have participants create a lesson plan that includes the use of presentation software; have participants use presentation software to design a presentation.

**Figure 2.3 – Detailed ICT-CFT objectives**

## **2.2 Difficulties and barriers of programme assessment**

The study of the research materials has revealed a number of difficulties to conduct a detailed analysis of the selected training programs for their compliance with UNESCO ICT-CFT. They can be roughly grouped as follows:

- *Distinction between the ICT-CFT levels (TL, KD and KC)*
  - ICT-CFT has no distinct criteria for separating the three levels and their cumulative character is not always visible. As a result, authors of the programs (ICT-CFT users) consider the three approaches (levels) as different aspects and try to take them all into account.
  - The vast majority of programmes do not implement all six modules. Moreover, sometimes different parts of the programme can be referred to different approaches (levels). In fact, a partly horizontal layout often takes place (for example, “standard classroom” and “collaborative groups” are regarded).



- In addition, training programmes are often focused on just some of the aspects of some of the 18 modules. For example, there are programmes that address only “information security” aspects (TL.6c).
  - When assessing the programmes, the authors tend to raise their level, referring to specific examples from the ICT-CFT and to some vague wording in formulation of competencies (and objectives). Examples are given in Appendix 1.
- *ICT-CFT frame*
    - The ICT-CFT matrix itself is sometimes poorly formalized (in terms of practical comparative assessment).
    - The modules content of the matrix is not even. For example, the KC level requires the ability to develop strategic documents, and as the technical skills it is recommended to teach tools for multimedia content creation.
    - Some modules of the matrix contain overlapping indicators, criteria, and competencies.
  - *Knowledge Creation (KC) level*
    - This level is often achieved by individual work (individual students’ projects, contests, etc.), which raises doubts about the prospects of mass training of students at this level.
    - It is not clear whether this level should include students’ traditional scientific and research activities.

- It is not clear whether the existing network projects and teachers' communities, such as Intel Letopisi.Ru or Microsoft Innovative Teachers Network, refer to this level.
- *Large number of programmes and very poor methodological description*
  - For reliable analysis, the thorough study of training materials and other technical documentation is required.
  - There are many seminars, webinars, and cases that are in line with the ideas of KC level modules, but their systematization is quite time consuming.
  - Shallow analysis conclusions (based on the course annotation or content) are hard to justify in case the authors do not agree with them.

To overcome the difficulties the following actions have been done:

- The total number of studied programmes was reduced for experimental adjustment of assessment methods
  - Federal State Education Standards of higher education for the major group "Education and Pedagogy" (050000)
  - Teacher training and retraining programmes implemented by the Federal state autonomous education institution "Academy of Professional Development and Retraining of Education Professionals" (APDREP)

- Programmes of big ICT vendors (Intel, Microsoft, and others) that have descriptions publicly available and wide reach of target audience
- Analysis of the programmes for compliance with ICT-CFT modules was done without a detailed comparison at the level of sub-objectives
- The mechanism of authors' assessment of their own courses was piloted (see Attachment 1)

### **2.3 General scheme of programme assessment**

The general scheme for the evaluation of training programmes in terms of their compliance with UNESCO ICT-CFT included the following steps:

- Search for training programmes with a detailed description of their structure and content
- Selection of the most popular and widely used training programmes
- Identification of “methodological mark-ups” in the programmes; e.g., description of a course student model, target audience, expected learning outcomes, acquired competencies, etc.
- General expert analysis of training and instruction materials' content; e.g., programmes, curricula, training materials, etc.
- Identification of comparison criteria; construction of models of comparative tables and forms of research
- Collecting and using experimental data
- Carrying out comparative analysis to reveal the problem zones

- Providing recommendations to eliminate the revealed shortcomings and non-compliance of a programme with UNESCO ICT-CFT requirements

The concrete realization of the suggested method was carried out depending on the character of the input data and its specific structure. For example, comparative analysis of FSES HE with regard to its compliance to UNESCO ICT-CFT used conventional methodological constructions for the Russian system of education (Table 1).

**Table 2.1 – UNESCO ICT-CFT interpretation**

No.	UNESCO ICT-CFT	FSES HE
1	Module title	Module of education cycle, name of competence
2	Training programme	Sphere of application, types and goals of professional activity
3	Teacher competencies	Competencies of graduates, description of competencies
4	Objectives (Teacher should be able to ...)	Learning outcomes (competencies, knowledge, and skills mastering level) and, in some cases, details of competencies
5	Example methods	Main ways of acquiring competencies

### 3. Assessment of training programmes for compliance with UNESCO ICT-CFT

#### 3.1 Analysis of the programmes of higher education

##### 3.1.1 Initial data

A key document regulating the content of the education process in higher education is the Federal State Education Standards for Higher Professional Education (FSES HE). Universities should use it as a basis for developing and annually updating their Main education programmes (MEP) for each direction, profile, and master's programme implemented. MEP, in turn, have a number of other regulatory documents that specify the requirements for content and organization of the education process.

FSES HE corresponding to the “Education and pedagogy” major group were used as the initial data in the analysis (Table 3.1)

**Table 3.1 – FSES HE “Education and Pedagogy” major group specialties**

<b>FSES</b>	<b>Specialty Name</b>	<b>Level</b>
050100	Pedagogical education	bachelor/ master
050400	Psychological and pedagogical education	
050700	Special (defectological) education	
051000	Professional education (by subject area)	
050407	Pedagogy and psychology of deviant behaviour	specialist

FSES is a regulatory document approved by the Ministry of Education and Science of the Russian Federation, and it consists of the following sections:

- Sphere of application
- Terms, definitions, and abbreviations
- Specialty characteristics
- Characteristics of professional activity
  - Sphere
  - Objects
  - Types
  - Goals
- Requirements to MEP mastering results
  - General culture competencies (GC)
  - Professional competencies (PC)
    - General professional competencies
    - Professional competencies specific for certain types of activities
- Requirements to the MEP structure
- Requirements to MEP implementation conditions
  - General requirements
  - Requirements to organization of educational and professional practice
  - Staffing requirements to support the education process
  - Requirements for the methodological and informational support of the education process

- Requirements for financial support of the education process
- Requirements for the logistics of the education process
- Quality assessment of MEP mastering
- List of the academic community representatives and employers involved in the development of FSES HE

### 3.1.2 Analysis of professional activities characteristics

The process of ICT application in education leads to a change in the role of teachers and educators, as well as to the emergence of new goals in their professional activities. To some extent, this is reflected in FSES, which explicitly specifies the tasks associated with the use of ICTs (Tables 3.2 and 3.3).

**Table 3.2 – Comparative analysis of the goals of bachelor’s and specialist’s professional activities**

<b>FSES code</b>	<b>FSES</b>	<b>Professional goals of bachelors and specialists</b>
050100	Pedagogical education	The use of opportunities provided by education environment to ensure the quality of education, in particular through application of information technologies
050400	Psychological and pedagogical education	The use of scientific methods and modern information technologies in professional activities
050700	Special (defectological) education	No focus on the use of ICTs in professional activities
051000	Professional education (by subject area)	

**Table 3.3 – Comparative analysis of the goals of master’s professional activities**

	<b>FSES</b>	<b>Professional goals of masters</b>
050100	Pedagogical education	<ul style="list-style-type: none"> <li>▪ Use of existing education environment opportunities and design of new conditions, in particular involving ICT, to ensure quality of education</li> <li>▪ Planning, organization, implementation, and evaluation of results of scientific research in the field of education with the use of modern scientific methods, as well as information and innovation technologies</li> <li>▪ Use of existing education environment opportunities and design of new conditions, in particular involving ICT, to solve scientific research problems</li> <li>▪ Content design of new disciplines and elective courses for pre-profile and profile training; development of forms and methods of control, in particular based on information technologies</li> <li>▪ Use of existing education and social environments, as well as design of new information environments, for the development of methodological support of educators’ activities.</li> <li>▪ Use of modern ICTs and mass media to solve various cultural and educational challenges</li> </ul>
050400	Psychological and peda-	<ul style="list-style-type: none"> <li>▪ Development and use of modern methods of psycho-</li> </ul>



	<b>FSES</b>	<b>Professional goals of masters</b>
	gological education	logical and educational research, including information and computer methods, with the use of modern methods for processing results , as well as modern data and knowledge bases (networks and Internet technologies)
050700	Special (defectological) education	<ul style="list-style-type: none"> <li>▪ Creation of innovative (information) technologies for optimization of special needs education</li> <li>▪ Use of existing education environment opportunities and design of new (information) technologies to solve scientific research problems</li> </ul>
051000	Professional education (by subject area)	No focus on the use of ICTs in professional activities
050407	Pedagogy and psychology of deviant behaviour	

## Conclusions

The analysis of characteristics of professional activities in the FSES HE major group "Education and Pedagogy" shows that:

- at the bachelor's and specialist's levels, not enough attention is paid to the use of ICT in professional activities.
- at the master's level, the use of ICTs in professional activities is emphasized in three of the four specialties, especially in FSES "050100 – Pedagogical education," but mainly for research activities. For other types of activities, the goals are not sufficiently specified.

## **Recommendations**

It is recommended that the use of ICT in educators' professional activities be explicitly indicated in the characteristics of professional activities within the FSES HE "Education and Pedagogy" major group for all levels of education and for all types of professional activities.

### **3.1.3 Analysis of requirements to MEP mastering results**

The basic requirements established by FSES on MEP mastering results are formulated as 'general culture' and 'professional' competencies, and are described in the corresponding FSES section.

Analysis of existing standards shows that developers used different approaches, combining them inconsistently, and sometimes confusing competencies with skills and abilities. At the same time, the most common definition of competency accepted in FSES is "*the ability (preparedness) to apply the knowledge, skills, and personal qualities to successfully perform activities in a particular area*". Taking into account that FSES separately describes *sphere, objects, types, and goals of professional activities*, as well as *knowledge, skills, and abilities*, competencies are a kind of a link, connecting all these elements.

**Table 3.4 – Comparative analysis of bachelor’s and master’s competencies**

<b>FSES</b>	<b>General culture competencies</b>	<b>Professional competencies</b>
050100 - Pedagogical education	<ul style="list-style-type: none"> <li>▪ prepared to use basic methods, ways and means of acquisition, saving and processing of information; prepared to use a computer as a means of information management (OK-8)</li> <li>▪ able to work with information in global computer systems (OK-9)</li> <li>▪ able to understand the meaning and significance of information in the development of modern information society, recognize the dangers and threats that arise in the process, respect basic information security requirements, including national security information, including state secret protection (OK-12)</li> </ul>	<ul style="list-style-type: none"> <li>▪ prepared to use modern methods and technologies, in particular, information technologies, to ensure education and upbringing quality at a particular level of education (IIK-2)</li> <li>▪ able to use opportunities of education environment, in particular, information environment, to ensure education and upbringing quality at a particular level of education (IIK-4)</li> </ul>
050400 - Psychological and pedagogical education	<ul style="list-style-type: none"> <li>▪ has skills and knows how to use basic methods, ways, and means of acquisition, saving, and processing of information; has skills to use a computer as a means of information management; understands the meaning and significance of information</li> </ul>	<ul style="list-style-type: none"> <li>▪ able to use a modern computer, information, and communication technologies in professional activities (OII-3)</li> </ul>

FSES	General culture competencies	Professional competencies
	in the development of modern information society; able to work with information in global computer systems (OK-7)	
050700 - Special (defectological) education	<ul style="list-style-type: none"> <li>▪ able to use knowledge about the modern scientific worldview in educational and professional activities; apply methods of mathematical processing of information, theoretical, and experimental research methods; able to master basic methods, modalities; and means of information acquisition, saving; and processing, has skills to use a computer (OK-4)</li> </ul>	
051000 - Professional education (by subject area)	<ul style="list-style-type: none"> <li>▪ able to use a computer (basic skills) (OK-23)</li> </ul>	

**Table 3.5 – Comparative analysis of master’s and specialist’s competencies**

<b>FSES</b>	<b>General culture competencies</b>	<b>Professional competencies</b>
050100 - Pedagogical education	<ul style="list-style-type: none"> <li>▪ able to independently acquire new knowledge and skills through information technologies and put them in practice, in particular, in new areas of knowledge not directly related to the field of activities (OK-5)</li> </ul>	<ul style="list-style-type: none"> <li>▪ able to develop forms and methods of control of education quality, as well as controlling instruments, in particular, based on information technologies and using international experience (IIK-15)</li> <li>▪ able to use modern ICTs and mass media to solve various cultural and educational challenges (IIK-20)</li> </ul>
050400 - Psychological and pedagogical education	<ul style="list-style-type: none"> <li>▪ has practical skills to search for scientific and professional information using modern computer and Internet technologies as well as data and knowledge bases (OK-3)</li> </ul>	
050700 - Special (defectological) education	<ul style="list-style-type: none"> <li>▪ able to independently acquire new knowledge and skills through information technologies and put them in practice, in particular, in new areas of knowledge not directly related to the field of activities (OK-5); broadens and deepens scientific outlook (OK-6)</li> </ul>	<ul style="list-style-type: none"> <li>▪ ability to create innovative, information technologies for optimization of special needs education process (IIK-4)</li> <li>▪ ability to use existing education environments and create new ones to solve scientific</li> </ul>

FSES	General culture competencies	Professional competencies
		research problems, in particular, information environments (PIK-13)
051000 - Professional education (by subject area)	<ul style="list-style-type: none"> <li>▪ able and prepared to independently acquire new spheres of knowledge through information technologies and use professional pedagogical activities (OK-9)</li> </ul>	
050407 Pedagogy and psychology of deviant behaviour	<ul style="list-style-type: none"> <li>▪ able to utilize different types of information, information resources, and technologies to apply common methods, techniques, and means of acquisition, saving, searching, systematization, processing, and transfer of information. (OK-14)</li> </ul>	

### Conclusions:

The most important findings in the analysis of the competencies in the FSES HE major group "Education and Pedagogy" are:

- At the bachelor's, specialist's, and master's levels, the ICT usage competencies refer mostly to those of general culture. The bachelor's and master's level of FSES "050100 – Pedagogical education" and in the mas-

ters' "050700 - Special (defectological) education", in which general culture ICT competencies are completed with professional ones.

- There is no uniformity in the wording of competencies. General culture competencies that don't vary between related groups of specialties are not standardized.
- The formulated competencies are too generic and fragmentary, which makes it hard to evaluate particular graduates' competencies. It is difficult to judge their completeness; i.e., whether they cover the whole range of professional activities.

### **Recommendations:**

It is recommended that the requirements to the MEP mastering results corresponding to the FSES HE "Education and Pedagogy" major group for all levels:

- include requirements of acquisition of ICT competencies in compliance with UNESCO ICT-CFT.
- indicate the required mastering level of corresponding competencies (learning output) for:
  - Bachelor's programmes – «Knowledge Deepening» (KD)
  - Specialist's and Master's programmes – «Knowledge Creation» (KC)

It is also recommended that the corresponding amendments to federal universities standards are made for the period of FSES validity. They should be targeted at the "Knowledge Creation" level of UNESCO ICT-CFT.

### 3.1.4 Analysis of MEP structure

The FSES “Requirements to MEP structure” section, in spite of its title, contains detailed requirements not only for the structure, but also for the whole volume and content of the education process in a conventional “knowledge – abilities (know-how) – skills” model, or KAS. However, the model description is not given briefly, for the programme as a whole, but for each structural element of the programme:

- knowledge
- abilities (know-how)
- skills

In standards, these KAS elements are grouped in cycles and other sections, which are slightly different for bachelor’s and master’s training programmes.

**Table 3.6 – FSES cycles**

<b>Bachelor</b>	<b>Master</b>
Cycle of Humanities, Social Studies and Economics	General Science cycle
Maths and Natural Science cycle	
Professional cycle	
Education and work practice	Practices and scientific research work
Final state examination	

Each cycle has a basic part (defined by FSES) and a variable part (defined by the MEP). For each part, the following is defined:

- Amount of study, in credits (hours)
- list of KAS



- list of disciplines for development of approximate programmes, as well as textbooks and training materials
- codes of competencies to be formed

Unfortunately the codes of competencies and KAS are not explicitly related.

They are presented in a format “many-to-many”. The analysis of the FSES HE major group “Education and Pedagogy” is presented in Tables 3.7 and 3.8.

**Table 3.7 – Comparative analysis of bachelor’s KAS**

<b>FSES</b>	<b>Knowledge (to know...)</b>	<b>Abilities (to be able to...)</b>	<b>Skills (to have skills to...)</b>
050100 - Pedagogical education	<ul style="list-style-type: none"> <li>▪ technologies of gathering, processing, and presentation of information</li> </ul>	<ul style="list-style-type: none"> <li>▪ use modern information and communication technologies (including application packages, local networking, and Internet) for gathering, processing, and analysis of information</li> <li>▪ assess software and perspectives of its application in the context of reaching professional goals</li> </ul>	<ul style="list-style-type: none"> <li>▪ skills to operate common and professional software</li> <li>▪ skills to use basic software for information protection</li> <li>▪ organizational measures and techniques for anti-virus protection;</li> </ul>
050400 - Psychological		<ul style="list-style-type: none"> <li>▪ use modern information technologies</li> </ul>	<ul style="list-style-type: none"> <li>▪ use modern computer and information tech-</li> </ul>

<b>FSES</b>	<b>Knowledge (to know...)</b>	<b>Abilities (to be able to...)</b>	<b>Skills (to have skills to...)</b>
and pedagogical education		in professional activities	nologies
050700 - Special (defectological) education	<ul style="list-style-type: none"> <li>▪ current state and trends of software, information technologies, and computer systems development</li> <li>▪ latest educational technologies, including information and communication technologies, as well as special audio-visual technologies</li> </ul>	<ul style="list-style-type: none"> <li>▪ to assess software and perspectives of its application in the context of reaching professional goals</li> <li>▪ use a computer, work with global and local search systems, and with conventional information carriers;</li> </ul>	<ul style="list-style-type: none"> <li>▪ use personal computer as a user</li> <li>▪ have a culture of logic thinking, use analytical and synthetic methods to process information, have skills to work with information in global computer networks.</li> </ul>
051000 - Professional education (by branches)	No explicit requirements, although “Informatics” is in the list of recommended disciplines.		

**Table 3.8 – Comparative analysis of master’s and specialist’s KAS**

<b>FSES</b>	<b>Knowledge (to know...)</b>	<b>Abilities (to be able to...)</b>	<b>Skills (to have skills to...)</b>
050100 -	<ul style="list-style-type: none"> <li>▪ principles of use</li> </ul>	<ul style="list-style-type: none"> <li>▪ integrate modern in-</li> </ul>	<ul style="list-style-type: none"> <li>▪ gain professional</li> </ul>

<b>FSES</b>	<b>Knowledge (to know...)</b>	<b>Abilities (to be able to...)</b>	<b>Skills (to have skills to...)</b>
Pedagogical education	of modern information technologies in professional activities	formation technologies into educational activities	knowledge through the use of original sources, including electronic sources, in different languages, and from different areas of general and professional culture
050400 - Psychological and pedagogical education			<ul style="list-style-type: none"> <li>▪ use modern computer means and innovative technologies to organize professional activities, including information and network technologies</li> </ul>
050700 - Special (defectological) education	<ul style="list-style-type: none"> <li>▪ modern information and communication technologies</li> </ul>	<ul style="list-style-type: none"> <li>▪ work with various sources of information</li> <li>▪ use information and communication technologies in professional activities</li> <li>▪ form information</li> </ul>	<ul style="list-style-type: none"> <li>▪ methods, techniques, and means of acquiring, saving, and processing information</li> </ul>

<b>FSES</b>	<b>Knowledge (to know...)</b>	<b>Abilities (to be able to...)</b>	<b>Skills (to have skills to...)</b>
		bases	
051000 - Professional education (by subject area)	<ul style="list-style-type: none"> <li>▪ computer technologies in science and education</li> <li>▪ methods of computer planning and processing of experiment results</li> <li>▪ personal computer software packages for design and content selection of professional learning</li> </ul>	<ul style="list-style-type: none"> <li>▪ use application programs to solve professional and scientific pedagogical problems</li> <li>▪ use modern information and communication technologies in professional and educational activities</li> <li>▪ use multimedia systems</li> </ul>	<ul style="list-style-type: none"> <li>▪ use methods of information acquisition, saving, and processing</li> </ul>
050407- Pedagogy and psychology of deviant behaviour	<ul style="list-style-type: none"> <li>▪ basic methods and means of information search, systematization, processing, transfer</li> <li>▪ soft- and hardware composition, functions, and features</li> <li>▪ composition, func-</li> </ul>	<ul style="list-style-type: none"> <li>▪ solve various work tasks with the help of a computer</li> <li>▪ use local and global networks</li> <li>▪ self-train in modern computer environments</li> <li>▪ organize a work station</li> </ul>	<ul style="list-style-type: none"> <li>▪ computer processing of office documents, statistics, and business graphics; use of professional information search, reference systems, and databases</li> <li>▪ ensure security and protection of information, state secrets, and other</li> </ul>

FSES	Knowledge (to know...)	Abilities (to be able to...)	Skills (to have skills to...)
	<p>tions, purpose, and features of professional information search engines and legal systems</p> <ul style="list-style-type: none"> <li>▪ modern computer technologies used for professional tasks performance</li> <li>▪ methods and ways of ensuring information security in professional activities</li> </ul>	<ul style="list-style-type: none"> <li>▪ use methods and means to ensure information security</li> <li>▪ use the techniques and tools of information security to prevent unauthorized access, improper modification, or loss of information of governmental secrets and other proprietary information.</li> </ul>	<p>proprietary information.</p>

### Conclusions:

The analysis of requirements of the structure of the FSES HE major group “Education and Pedagogy” in “knowledge-abilities-skills” (KAS) format shows that:

- the structure of requirements to KAS is not even, since it manifests itself differently in each FSES.

- in general, the requirements for skills and abilities prevail over those for knowledge, which emphasizes the application and service role of ICT competencies.
- despite the dominance of general cultural competencies, more attention in KAS is paid to professional aspects.
- the KAS matrix presented discloses only selected requirements, and is not systemic in nature as the UNESCO ICT-CFT is.

**Recommendations:**

It is recommended that the requirements of the MEP structure corresponding to FSES HE “Education and pedagogy” major group at all levels:

- include the six modules, presented in UNESCO ICT-CFT into the professional (general professional) cycle.
- indicate competencies indicators presented in the corresponding sections of UNESCO ICT-CFT for each level of MEP mastering (learning outcomes).

As the competencies and requirements are presented in the FSES and the UNESCO ICT-CFT in different formats, it is recommended that a comparison method be developed<sup>5</sup>.

It is also recommended that the corresponding amendments to university MEPs are made for the period of FSES validity.

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<sup>5</sup> The possible option for this method as well as regulating document could become a ‘Typical Education programme’ (<http://it-claim.ru/top>)

Finally, it is recommended that the above mentioned amendments are also made on the federal universities standards, targeting them to the “Knowledge Creation” level of UNESCO ICT-CFT.

### 3.1.5 Analysis of the other FSES HE sections

Analysis of the other FSES HE sections revealed that paragraph 7.13 (section “Requirements to MEP implementation conditions”) should be regarded in the research, as it says that university MEP should include laboratory courses and workshops on modern information technology.

**Table 3.9 – Requirements to the compulsory labs**

<b>FSES code</b>	<b>FSES</b>	<b>Paragraph 7.13</b>
050100	Pedagogical education	Bachelor’s university MEP should include laboratory works and practical training within the main disciplines (modules), which master students’ skills and abilities in the sphere of information technologies.
050400	Psychological and pedagogical education	Bachelor’s university MEP should include laboratory works and practical training within the Module 2: Practical training on modern information technologies.
050700	Special (defectological) education	Bachelor’s university MEP should include laboratory works and practical training within the main disciplines (modules), which master students’ skills and abilities in the sphere of information technolo-

		gies in special needs education.
051000	Professional education (by subject area)	Bachelor's university MEP should include laboratory works and practical training in the following disciplines: computer practical training

It is important to note that the amount of study required to master the competencies, knowledge, abilities, and skills indicated in the sections above is small. For instance, in a number of exemplary MEPs published, the amount of study was only 2 credits or 72 hours.

### **Conclusions:**

The acquisition of practical skills in the use of ICT is a compulsory element of education programmes, but the limited amount of study proposed and the fact that there is no direct connection with the professional cycle are major drawbacks.

### **Recommendations:**

It is recommended to estimate the study load for mastering UNESCO ICT-CFT competencies, calculate it in credits according to the national credit system, and recommend these figures as the basis for curricular development.



### 3.1.6 FSES correspondence to ICT-CFT

The comparative analysis of the FSES HE for correspondence to ICT-CFT levels is presented in Table 3.10.

**Table 3.10 – FSES Correspondence to ICT-CFT levels**

<b>FSES code</b>	<b>FSES</b>	<b>Level</b>	<b>ICT-CFT Module</b>	<b>Code</b>
050100	Pedagogical education	Bachelor	Technology literacy: <ul style="list-style-type: none"> <li>▪ ICT (Basic tools)</li> <li>▪ Pedagogy (Integrate technology)</li> <li>▪ Teacher professional learning (Digital literacy)</li> </ul>	TL.3, TL.2 TL.6
		Master	Knowledge deepening, Knowledge creation: <ul style="list-style-type: none"> <li>▪ Correspondence to some indicators</li> </ul>	KD KC
050400	Psychological and pedagogical education	Bachelor	Technology literacy: <ul style="list-style-type: none"> <li>▪ ICT hard- and software (basic)</li> </ul>	TL.3
		Master	Technology literacy: <ul style="list-style-type: none"> <li>▪ ICT (Basic tools)</li> <li>▪ Pedagogy (Integrate technology)</li> </ul>	TL.3 TL.2
050700	Special (defectological) education	Bachelor	Technology literacy: <ul style="list-style-type: none"> <li>▪ ICT (Basic tools)</li> <li>▪ Pedagogy (Integrate technology)</li> </ul>	TL.3 TL.2
		Master	Knowledge deepening, Knowledge creation:	KD KC

FSES code	FSES	Level	ICT-CFT Module	Code
			<ul style="list-style-type: none"> <li>▪ No details</li> </ul> Technology literacy: <ul style="list-style-type: none"> <li>▪ Teacher professional learning (Digital literacy)</li> </ul>	TL.6
051000	Professional education (by subject area)	Bachelor	-	-
		Master	Technology literacy: <ul style="list-style-type: none"> <li>▪ ICT (Basic tools)</li> <li>▪ Pedagogy (Integrate technology)</li> <li>▪ Teacher professional learning (Digital literacy)</li> </ul> Knowledge deepening <ul style="list-style-type: none"> <li>▪ Complex tools</li> </ul>	TL.3 TL.2 TL.6 KD.4
050407	Pedagogy and psychology of deviant behaviour	Specialist	Technology literacy: <ul style="list-style-type: none"> <li>▪ ICT (Basic tools)</li> <li>▪ Pedagogy (Integrate technology)</li> <li>▪ Teacher professional learning (Digital literacy)</li> </ul>	TL.3 TL.2 TL.6

### 3.2 Analysis of teacher training programmes

#### 3.2.1 Initial data

Data from the APE programmes of the Federal State Autonomous Education Institution “Academy of Professional Development and Retraining of Education Professionals” (APDREP) was used as initial data.

**Table 3.11 – TABLE TITLE**

<b>No.</b>	<b>Course title and brief description</b>	<b>Target audience (professionals categories)</b>	<b>Amount of study, training format</b>
	<p>Methodology for the systemic use of multimedia learning tools in the organization of the education process.</p> <p>The course is aimed at developing in teachers a readiness to use multimedia learning tools in their professional subject area, to use basic Internet services and software systems in professional activities, and to organize the education process with the use of modern multimedia tools.</p>	<p>School principals and vice-principals, methodologists, APE education personnel</p>	<p>144 hours; part-time training</p>
	<p>Methodology for the use of information and communication technology in primary school in conditions of adoption of Federal state education standard of primary education.</p> <p>The course is aimed at developing a readiness in education managers, education primary school specialists, and teachers to integrate educational ICT tools and resources into their pedagogical practice in line with FSES of primary education.</p>	<p>School principals and vice-principals, methodologists, APE education personnel</p>	<p>144 hours; part-time training</p>
	<p>Methodology for the use and incorporation of multimedia learning tools into the education process in light of the transition to the new education standards.</p>	<p>School principals and vice-principals, methodologists, APE education personnel</p>	<p>72 hours; in-service training</p>

<b>No.</b>	<b>Course title and brief description</b>	<b>Target audience (professionals categories)</b>	<b>Amount of study, training format</b>
	The course is aimed at acquisition of knowledge on the use of multimedia learning tools in the education process on the basis of new education standards.		
	Computer threats: detection and analysis The course is aimed at developing professional competency, skills, and abilities for understanding the security principles of computer use and networking.	Managers and specialists of education management departments and education institutions	72 hours; in-service training
	The use of innovative learning tools in the school education process. The course is aimed at acquisition of knowledge on the use of multimedia learning tools in the education process on the basis of new education standards. Methodological features of multimedia learning tools will be regarded for the organization of the education process in accordance with reproductive learning technology and activity-based approach.	School principals and vice-principals, methodologists, APE education personnel	72 hours; in-service training
	Computer and Internet security The course is aimed at developing behavioural skills in information society to ensure security of information. It develops design of secure infor-	HE, SVE, and APE education personnel	72 hours; in-service training

<b>No.</b>	<b>Course title and brief description</b>	<b>Target audience (professionals categories)</b>	<b>Amount of study, training format</b>
	<p>mation environment skills for higher education institutions in the psychological, pedagogical, and health areas, conserving support of the education process, ensuring protection of students and educators, and using personal computers and Internet in professional, educational and extra-curriculum work.</p>		
	<p>Methodology of the use of electronic educational resources (EER) of new generation in conditions of FSES implementation</p> <p>The course is aimed at studying pedagogical aspects of ICT and EER use for teaching and learning, with the objective of eliminating the gap between potential ICT and ERR capabilities and those used in practice.</p> <p>The new model of ICT and EER as an instrument of activity-based approach is introduced. This involves the development and testing of a pedagogically appropriate and methodologically justified use of ICT and EER – as a means to raise cognitive motivation of students, as the instrument of forming students' ability to solve new range of</p>	HE and SVE education personnel	144 hours; part-time training

<b>No.</b>	<b>Course title and brief description</b>	<b>Target audience (professionals categories)</b>	<b>Amount of study, training format</b>
	educational and practical tasks, and as a tool of modern learning.		
	<p>Methodology of the use and incorporation into education process of multimedia learning tools in light of the transfer to the new education standards</p> <p>The course is aimed at acquisition of knowledge on the use of multimedia learning tools in the education process on the basis of new education standards.</p>	School principals and vice-principals, methodologists, APE education personnel	72 hours; in-service training
	<p>Teaching methodology of algorithmization and programming in C++ to solve problem tasks.</p> <p>The course regards methodological and practical issues of applied problem solving using C++ language by means of Turbo Pascal language and in Delphi visual programming environment.</p> <p>Provides training to master the techniques for solving typical, untypical, and challenging application problems, and develops the ability to use the capabilities of programming environments in teaching.</p>	HE and SVE education personnel	72 hours; in-service training
	Development of web resources using the technology of web site design in Content Management	Education personnel of pedagogical institu-	72 hours; in-service train-

<b>No.</b>	<b>Course title and brief description</b>	<b>Target audience (professionals categories)</b>	<b>Amount of study, training format</b>
	<p>System (CMS).</p> <p>Teacher training and professional development is connected with the increased needs of education institutions to expand their activities on the Internet, using information and communication technologies.</p>	<p>tions, SVE institutions, education managers</p>	<p>ing</p>
	<p>Web resources development through the use of Content Management System's website builder.</p> <p>Teacher training and professional development is connected with the increased needs of education institutions to expand their activities on the Internet, using information and communication technologies.</p>	<p>Education personnel of pedagogical institutions, SVE institutions</p>	<p>72 hours; in-service training</p>
	<p>The use of information and communication technologies in the management of education institutions.</p> <p>The course provides professional development aimed at mastering professional competencies for the management of modern education institutions, using information and communication technologies. Contains the training on education process planning on the basis of multimedia learning tools application. Practical work is based on the multi-</p>	<p>School principals and vice-principals, APE education personnel</p>	<p>144 hours; part-time training</p>

<b>No.</b>	<b>Course title and brief description</b>	<b>Target audience (professionals categories)</b>	<b>Amount of study, training format</b>
	media learning products of the “Prosveshchenie media” company.		
	<p>Professional development in the area of ICTs.</p> <p>The course is aimed at forming and developing ICT competencies in educators. It should prepare them to form in future teachers a system of knowledge, abilities, and skills in the area of ICT use in teaching and learning, which constitutes the basis for forming the competencies in ICT use in education process</p>	Education personnel of pedagogical institutions, education managers and personnel of methodological centres	72 hours; in-service training
	<p>Practical course on the use of MS EXCEL 2007 in pedagogical research.</p> <p>The course of professional development of education personnel to develop skills MS Excel 2007 use for table and graphic presentation of research results, creation of reports, etc.</p>	School principals and vice-principals, instructors, APE education personnel	144 hours; part-time training
	<p>Professional development in the area of ICTs.</p> <p>The course is aimed at forming and development of ICT competencies of educators. It should prepare them to form in future teachers a system of knowledge, abilities and skills in the area of ICT use in teaching and learning, which constitutes the basis for forming the competencies in ICT use</p>	School principals and vice-principals, instructors, APE education personnel, Education personnel of pedagogical institutions and methodological	144 hours; part-time training



No.	Course title and brief description	Target audience (professionals categories)	Amount of study, training format
	in education process.	centres	
	Methodology of the use and incorporation of multimedia learning tools into the education process in the light of transfer to new education standards.  The course is aimed at obtaining knowledge through the use of multimedia learning tools in the education process on the basis of new education standards.	HE, VET and APE education personnel	144 hours; part-time training

### 3.2.2 Correspondence of teacher training programmes to UNESCO ICT-CFT

The assessment of correspondence of the programmes to UNESCO ICT-CFT was carried out on the basis of annotations to the training courses, their target audience, and amount of study and detailed descriptions. Courses with duplicated content were excluded from the analysis.

**Table 3.12 – TABLE TITLE**

No.	Course title	ICT-CFT Module	Codes
1	Methodological features of systemic use of multimedia learning tools in the organization of the education process	Technology literacy: <ul style="list-style-type: none"> <li>▪ Understanding ICT in education (Policy awareness)</li> <li>▪ Curriculum and assessment (Basic knowledge)</li> <li>▪ Pedagogy (Integrate technology)</li> <li>▪ ICT (Basic tools)</li> <li>▪ Organization and administration (Standard classroom)</li> </ul>	TL.1 TL.2 TL.3 TL.4 TL.5

No.	Course title	ICT-CFT Module	Codes
2	Methodology for the use of information and communication technology in primary schools in conditions of adoption of Federal state education standards of primary education.	Technology literacy: <ul style="list-style-type: none"> <li>▪ Understanding ICT in education (Policy awareness)</li> <li>▪ Curriculum and assessment (Basic knowledge)</li> <li>▪ Pedagogy (Integrate technology)</li> <li>▪ ICT (Basic tools)</li> <li>▪ Organization and administration (Standard classroom)</li> </ul>	TL.1 TL.2 TL.3 TL.4 TL.5
3	Methodology for the use and incorporation of multimedia learning tools into education process in light of the transition to the new education standards	Knowledge deepening: <ul style="list-style-type: none"> <li>▪ Pedagogy (Complex problem solving)</li> <li>▪ ICT (Complex tools)</li> <li>▪ Organization and administration (Collaborative groups)</li> </ul>	KD.3 KD.4 KD.5
4	Computer threats: detection and analysis <sup>6</sup>	Technology literacy: <ul style="list-style-type: none"> <li>▪ Teacher professional learning (Digital literacy)</li> </ul>	TL.6c
5	The use of innovative learning tools in school education process	No detailed information	?TL
6	Computer and Internet security	Technology literacy: <ul style="list-style-type: none"> <li>▪ Teacher professional learning (Digital literacy)</li> </ul>	TL.6c
7	Methodology for the use of electronic educational resources (EER) of new generation in conditions of FSES implementation	Technology literacy: <ul style="list-style-type: none"> <li>▪ Pedagogy (Integrate technology)</li> </ul>	TL.3
8	Teaching methodology of algorithmization and programming in C++ to solve problem tasks	Technology literacy: <ul style="list-style-type: none"> <li>▪ Pedagogy (Integrate technology)</li> </ul>	TL.3
9	Development of web resources using the technology of web site design in Content Management System (CMS)	Knowledge deepening: <ul style="list-style-type: none"> <li>▪ ICT (Complex tools)</li> </ul>	KD.3

<sup>6</sup> The programme is implemented in cooperation with Kaspersky Lab

No.	Course title	ICT-CFT Module	Codes
10	Use of information and communication technologies in the management of education institutions.	Technology literacy: <ul style="list-style-type: none"> <li>▪ Understanding ICT in education (Policy awareness)</li> <li>▪ Curriculum and assessment (Basic knowledge)</li> <li>▪ Pedagogy (Integrate technology)</li> <li>▪ ICT (Basic tools)</li> <li>▪ Organization and administration (Standard classroom)</li> </ul>	TL.1 TL.2 TL.3 TL.4 TL.5
11	Practical course on the use of MS EXCEL 2007 in pedagogical research	Technology literacy: <ul style="list-style-type: none"> <li>▪ Pedagogy (Integrate technology)</li> <li>▪ ICT (Basic tools)</li> </ul>	TL.3 TL.4

### **Conclusions:**

A large number of teacher training programmes are widely represented and available in the market, aimed to develop competencies corresponding the “Technology literacy” (TL) level of UNESCO ICT-CFT.

However, complete compliance is questionable, since most of the programmes only to some extent, but not fully comply with UNESCO ICT-CFT indicators.

### **Recommendations:**

It is recommended to develop new specialized teacher training programmes that cover the whole matrix of UNESCO ICT-CFT modules and indicators, or to conduct a detailed analysis of the existing programmes and their specifications from the UNESCO ICT-CFT prospect.

It is also recommended to develop additional teacher training programmes aimed at mastering KD and KC level competencies, since there is a lack of such programmes at present.

### 3.3 Training programmes of ICT vendors

#### 3.3.1 Initial data

The initial data was comprised of materials freely available at education sections of IT vendors' official websites and other reliable sources.

**Table 3.13 – Intel educational initiatives**

No.	Programme/course title	Target audience	Duration	Format: classroom / distance	Comments
	<b>Intel® Teach to the Future</b>	<b>Schools</b>			<b>848,255 people trained in Russia since 2002</b>
1.	Project-based activity on information educational environment of 21st century	School teachers	36 72/12	Classroom/mixed mode	EMA Study guide
2.	Introduction to information and educational technologies of the 21st century	School teachers	24	Classroom	
3.	ICT: development strategy of an education institution	School principals	8	Classroom	ISTE standards and web 2.0 technologies are taught
4.	<b>Distance workshops:</b> <ul style="list-style-type: none"> <li>▪ Assessment in education: from evaluation for control to evaluation for development</li> <li>▪ Web 2.0 Joint Band: Network collaboration tools</li> <li>▪ Web 2.0 services (with additional workshops on Google Wave, Dabbleboard, Prezi, knowledge maps, and video services)</li> <li>▪ Technological methods of enhancing cognitive activity</li> <li>▪ Design of learning situations in line with new federal state education standards (FSSES)</li> </ul>	School teachers		Distance, guided	
5.	<b>Intel® Teach Elements series:</b> <ul style="list-style-type: none"> <li>▪ Project-based approaches</li> <li>▪ Assessment in 21<sup>st</sup> century classroom</li> </ul>	School teachers	10–14 12–16 10–14	Distance, self-training	

No.	Programme/course title	Target audience	Duration	Format: classroom / distance	Comments
	<ul style="list-style-type: none"> <li>▪ Collaboration in the digital classroom</li> </ul>				
6.	<b>Optional courses and trainings</b> <ul style="list-style-type: none"> <li>▪ Learn to think together</li> <li>▪ School students - researchers</li> <li>▪ Web 2.0 network</li> <li>▪ Managerial project in education</li> <li>▪ '1 student – 1 computer' education environment</li> </ul>	School teachers and principals	8–24	Classroom	
	<b>Intel® Learn Programme</b>	<b>Schools</b>			<b>Over 150 000 people trained since 2005</b>
7.	Technology and Community	2–7 grades			
8.	Technology at Work	5–9 grades			
9.	Technology and Entrepreneurship	8–11 grades			
10.	Intel Multi-core Curriculum Initiative	HE institutions			Resources in English
11.	Innovation and entrepreneurship in high technology: from theory to practice	HE institutions			
12.	Intel student labs	HE institutions			Limited number of universities
13.	Intel ISEF Educator Academy	Math and Natural Sciences teachers			Small number of trainees

Table 3.14 – Microsoft educational initiatives

No.	Programme/course title	Target audience	Duration	Format: classroom / distance	Comments
	<b>Microsoft Partners in Learning</b>	<b>Schools</b>			
1.	System of continuous self-defined professional development of educators	School teachers		Distance	Developed in line with UNESCO ICT-CFT; on-

					going pilot project in Russia
2.	Microsoft Academy for Teacher Training	School teachers	72	Classroom	Partners: National Training Foundation, AP-DREP. 47000 teachers have raised their level of ICT competence
3.	'Innovative Teachers Network' portal	School teachers		Distance	Many case studies of ICT-CFT TL- KC levels
4.	Microsoft Partners in Learning School Research to measure 21st Century teaching and learning skills	School administration			A methodology and criteria are developed, which can be used for comparison with ICT-CFT
5.	Microsoft IT Academy Programme	HE and SVE educators		Classroom, distance	Many training courses in distance and classroom format

**Table 3.15 – Kaspersky Lab educational initiatives**

No.	Programme/course title	Target audience	Duration	Format: classroom / distance	Comments
1.	Computer threats: detection and analysis methods	School and university teachers	72 hours	Classroom, distance	Classroom training. Diploma is awarded upon a completion. Organized in cooperation with AP-DREP.
2.	Information security days	School and university students	2–3 hours	Classroom	
3.	Webinars on various themes	School and university students	8+ hours	Distance	

### 3.3.2 Results of comparison with UNESCO ICT-CFT

Each programme was defined by type according to the classification presented in Chapter 1:

- **V<sub>1</sub>**: basic computer literacy and technological competency courses for educators, as well as advanced courses on the use of ICTs in education; e.g., *Intel® Teach to the Future* Programme
- **V<sub>2</sub>**: training courses for schools/universities delivered in the “academic mode” during the semester; e.g., Cisco Networking Academy courses
- **V<sub>3</sub>**: specialized trainings, training courses, and certification programmes for trainers of training centres; e.g., Microsoft Certified Trainer (MCT) programme
- **V<sub>4</sub>**: education methodological complexes to support technological training courses and designed for students of training centres

- **V<sub>5</sub>**: technology courses to train in the use of certain ICTs and provided in the education system on free or concessional terms; typically, linked to industrial certification
- **V<sub>6</sub>**: specialized courses for the heads of education institutions

**Table 3.16 – Intel educational initiatives**

No.	Programme/course title	Type	ICT-CFT
<b>Intel® Teach to the Future</b>			
1.	Project-based activity on information educational environment of 21st century	<b>V<sub>1</sub></b>	KD
2.	Introduction to information and educational technologies of the 21st century	<b>V<sub>1</sub></b>	TL
3.	ICT: development strategy of an education institution	<b>V<sub>6</sub></b>	TL-KD
4.	<b>Distance workshops:</b> <ul style="list-style-type: none"> <li>▪ Assessment in education: from evaluation for control to evaluation for development</li> <li>▪ Web 2.0 Joint Band: Network collaboration tools</li> <li>▪ Web 2.0 services (with additional workshops on Google Wave, Dabbleboard, Prezi, knowledge maps, and video services)</li> <li>▪ Technological methods of enhancing cognitive activity</li> <li>▪ Design of learning situations in line with new federal state education standards (FSES)</li> </ul>	<b>V<sub>1</sub></b>	KD
5.	<b>Intel® Teach Elements series:</b> <ul style="list-style-type: none"> <li>▪ Project-based approaches</li> <li>▪ •Assessment in 21<sup>st</sup> century classroom</li> <li>▪ Collaboration in the digital classroom</li> </ul>	<b>V<sub>1</sub></b>	KD
6.	<b>Optional courses and trainings</b> <ul style="list-style-type: none"> <li>▪ Learn to think together</li> <li>▪ School students - researchers</li> <li>▪ Web 2.0 network</li> <li>▪ Managerial project in education</li> <li>▪ ‘1 student – 1 computer’ education environment</li> </ul>	<b>V<sub>1</sub></b>	KD-KC
<b>Intel® Learn Programme</b>			
7.	Technology and Community	<b>V<sub>2</sub></b>	-



No.	Programme/course title	Type	ICT-CFT
8.	Technology at Work	V <sub>2</sub>	-
9.	Technology and Entrepreneurship	V <sub>2</sub>	-
10.	Intel Multi-core Curriculum Initiative Programme	V <sub>2</sub>	
11.	Innovation and entrepreneurship in high technology: from theory to practice	V <sub>2</sub>	KC
12.	Intel student labs	-	KC
13.	Intel ISEF Educator Academy	V <sub>2</sub>	KD-KC

**Table 3.17 – Microsoft educational initiatives**

No.	Programme/course title	Type	ICT-CFT
	<b>Microsoft Partners in Learning</b>		
1.	System of continuous self-defined professional development of educators	V <sub>1</sub>	TL.1 - TL.6
2.	Microsoft Academy for Teacher Training Programme	V <sub>1</sub>	TL.3
3.	‘Innovative Teachers Network’ portal	V <sub>1</sub>	KD-KC
4.	Microsoft IT Academy Programme	V <sub>2</sub> – V <sub>5</sub>	TL.4

**Table 3.18 – Kaspersky Lab educational initiatives**

No.	Programme/course title	Type	ICT-CFT
1.	Computer threats: detection and analysis methods	V <sub>1</sub>	TL.6c
2.	Information security days	V <sub>1</sub>	TL.6c
3.	Webinars on various themes	V <sub>1</sub>	TL.6c

**Table 3.19 – Training seminars of interactive technologies providers**

No.	Programme/course title	Type	ICT-CFT
1.	<p><i>Polymedia Club</i> seminars:</p> <ul style="list-style-type: none"> <li>▪ Introduction to SMART Notebook: (level I and II)</li> <li>▪ SMART Certified Interactive Teacher</li> <li>▪ SMART Certified Lesson Developer for primary teachers</li> <li>▪ Advanced SMART Notebook course for tutors</li> <li>▪ Introduction to SMART Response</li> <li>▪ Introduction to SMART Sync</li> <li>▪ The use of SANAKO Study 1200 software complex in teaching and learning foreign languages</li> <li>▪ SMART Notebook Training distance course for tutors</li> <li>▪ First steps in flash technologies. Creating multi-page flash-application in Adobe Flash</li> </ul>	<p>V<sub>1</sub>, V<sub>5</sub></p>	<p>TL.3 TL.5 KD.4c</p>
2.	Panasonic Academy for teachers	<p>V<sub>1</sub> V<sub>5</sub></p>	TL.3 – TL.5
3.	Seminars/webinars on the use of ActivInspire	<p>V<sub>1</sub> V<sub>5</sub></p>	<p>TL.3 – TL.5 KD.4c</p>
4.	<p>RENE courses:</p> <ul style="list-style-type: none"> <li>▪ New Information Technologies (the use of interactive boards)</li> <li>▪ Mobile interactive complexes in school education</li> </ul>	<p>V<sub>1</sub> V<sub>5</sub></p>	TL.3 – TL.5
5.	VOTUM seminars	V <sub>1</sub> ,	TL.4

**Table 3.20 – Technological courses of ICT vendors**

No.	Programme/course title	Type	ICT-CFT
1.	<i>Cisco Networking Academy</i> courses: <ul style="list-style-type: none"> <li>▪ IT Essentials: PC Hardware and Software</li> <li>▪ Introduction of network technologies</li> <li>▪ Design and technical support of computer networks</li> </ul>	<b>V<sub>2</sub></b>	TL.3 TL.4
2.	<i>EMC Academic Alliance</i> courses: <ul style="list-style-type: none"> <li>▪ Information storage and management</li> <li>▪ Cloud infrastructure and services</li> <li>▪ Big Data Analytics</li> <li>▪ Backup Recovery Systems and Architecture</li> </ul>	<b>V<sub>2</sub></b>	TL.3 TL.4
3.	<i>Adobe</i> courses: <ul style="list-style-type: none"> <li>▪ Digital design: Basics of web-design with Adobe tools</li> <li>▪ Digital video. Basics of video capturing, editing, and production with Adobe tools</li> <li>▪ Visual design: Graphic design and pre-press with Adobe.</li> </ul>	<b>V<sub>2</sub></b>	TL.3 TL.4
4.	Technological courses of other ICT vendors	<b>V<sub>2</sub></b>	TL.3 TL.4

### **Conclusions:**

ICT vendors offer technology courses and programmes that develop applied competencies of teachers.

However, a number of big ICT vendors (Intel, Microsoft, Kaspersky Lab) implement teacher training programmes on basic computer literacy and development of 21st century skills.

Some of the courses, programmes, and projects help to develop competencies related to higher levels (KD and KC) of the UNESCO ICT-CFT, but in general they are not popular (especially for KC level).

Vendors producing and delivering interactive equipment promote the development of advanced ICT competencies in ICT-rich education environment, but the training they offer is too utilitarian and is not of a systemic character. Therefore, these programmes can hardly cover the ICT-CFT modules.

**Recommendations:**

It is recommended that ICT vendors implementing teacher training develop training modules or special courses aimed at the development of ICT competencies described in the UNESCO ICT-CFT.

It is recommended that, when determining conditions for the implementation of training programs by certified trainers, compliance with the UNESCO ICT-CFT is taken into account.

It is recommended that programmes with educational content referring to higher levels of ICT-CFT ("Knowledge Deepening" and "Knowledge Creation") be developed or localized. Additionally, using the recommended educational technologies, a collection of cases must be created.

## CONCLUSION

The research presented in this document:

- reviewed and classified teacher training programmes
- developed a comparison method of training programmes, and suggested comparative criteria and a model of comparative tables
- conducted assessment of training programmes for compliance with the UNESCO ICT-CFT recommendations.
- Suggested approaches for the improvement of the training programmes to meet the requirements of the UNESCO ICT-CFT.

In the analysis of the training programmes for compliance with the UNESCO ICT-CFT, this report formulated local proposals (see Chapter 3), which are summarized below.

For the FSES HE “Education and Pedagogy” major group (050000), the recommendations are as follows:

1. *in the characteristics of professional activities* for each level and each type of professional activity, the goals of ICT use should be indicated explicitly
2. *in the requirements to MEP mastering:*
  - a. a requirement to acquire professional ICT competencies should be included, in accordance with UNESCO ICT-CFT international recommendations.

- b. the required mastering level (learning outcome) of corresponding competencies should be indicated as follows:
    - o for bachelor's programmes, «Knowledge deepening» (KD);
    - o for specialist's and master's programmes, «Knowledge creation» (KC).
3. *in the requirements to MEP structure:*
- a. the six UNESCO ICT-CFT modules should be included into the professional (general professional) cycle.
  - b. the competencies indicators presented in the corresponding sections of UNESCO ICT-CFT should be included for each level of MEP mastering (learning outcome)
4. corresponding amendments to university MEPs should be made for the period of FSES validity.
5. the above-mentioned amendments should be made to the federal universities standards, targeting them at the “Knowledge Creation” level of UNESCO ICT-CFT.

*To compare FSES requirements with UNESCO ICT-CFT provisions, this report recommends:*

1. developing a comparison method that takes into account the different formats of competencies and requirements in FSES and UNESCO ICT-CFT

2. estimating the study load for mastering UNESCO ICT-CFT competencies and calculate it in credits according to the national credit system
3. using these figures as the basis for curricular development.

*For developers and providers of additional professional education programmes, this report recommends:*

1. developing new specialized teacher training programmes that embrace all UNESCO ICT-CFT modules and indicators
2. conducting a detailed analysis of the existing programmes and their specifications from the UNESCO ICT-CFT point of view
3. developing new teacher training programmes that master KD and KC levels competencies, since there is a lack of such programmes at present time

*For ICT vendors, this report recommends:*

1. developing training modules or special courses aimed at the development of teacher ICT competencies described in the UNESCO ICT-CFT.
2. using the ICT competencies indicated in ICT-CFT to define the implementation conditions of training programmes by certified trainers
3. targeting the process of developing or localizing educational content to higher levels of ICT-CFT («Knowledge Deepening" and "Knowledge Creation"), creating special cases, and using the recommended education technologies

**Attachment 1. Example of teacher training course assessment  
conducted by the author of the course for compliance with  
UNESCO ICT-CFT**

**Professional training short course for English teachers**

*Theme: "The use of information technologies and Internet tools  
in teaching English"*

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**Author and trainer: L. V. Desyatkova**

**Relevance of the Training Programme**

This integrated course is proposed to raise the professional competency of teachers for a personality-oriented, activity-based, and competence-based approach to modern education. The changes in teaching and learning today create the need for a renovation of educational content and technologies. Currently, e-learning is the most effective form of learning, especially in the sphere of teacher training and development, and it has legal basis in Russia. Development of distance learning is one of the priorities of education.

The increasing complexity and dynamic change of the modern world, the emergence of a global information infrastructure, globalization, the "information boom" — all of these factors, together, call for a qualitative innovation-driven change in the paradigm of education implementation, especially in the field of professional development.



## **Novelty of the Training Programme**

The presented course programme is aimed at implementation of innovative research and development on the problems of Moscow education, which includes:

- development and testing of new education technologies, using models of integrated education within the system of professional development and retraining of teachers, namely, i) distance learning (DL), and ii) practical application and testing of new technologies in resource centres of CNYAO MIOO.
- creation of new models of educational content in a system of professional development and of retraining of teachers using the model of integrative learning, which enables teachers to obtain modern knowledge and master the necessary skills for design and use of information educational environment.

## **Subject of Learning**

The rapid development of scientific and technological progress opens up wide possibilities for penetration of new information technologies into the education space, which, in turn, leads to changes in education market demands.

Knowledge and skills in information and communication technologies should be used as effective tools to improve the teaching of subjects and courses. The main learning objective for the course is to develop in students the readiness and ability to use new information, communication, and education technologies in their professional activities, develop skills of independent projecting, and development of the education process with the use of ICTs. The training's approach is that that information and pedagogical support is not limited to raising computer literacy, basic ICT skills, and perception of existing software, but implies acquisition of abilities and skills to apply of the technologies learnt.

**Knowledge, skills and abilities acquired during the course:**

Upon the completion of the course, students should **acquire the knowledge** on:

- features of the use of modern information and communication technologies
- specifics of teaching activities on the Internet
- organization of a virtual learning environment

Upon the completion of the course, students should also acquire **skills and abilities** to:

- use ICT and Internet tools to organize the teaching process
- plan and design pedagogical situations with the help of modern technologies
- create and work in a virtual learning environment

**Conceptual Idea of the Training Programme**

The use of "blended learning" technology in this course is a new form of training, since at present there are only face-to-face and distance forms of training. Integrated education is a system that combines all the benefits of these two forms, where the face-to-face and distance components interact harmoniously. Thus, the model of "blended learning" is a single, coherent, modern, and efficient learning process.

**Aims and Goals of the Training Programme**

**Aim:** to form students' information competency and to teach effective ICT use in professional activities.

**Goals:** to form the idea of possible use of computer technologies in the education process and of teaching activities on the Internet; to develop ability to use ICTs; to master skills of using modern software.

## Target Audience of the Training Course.

The course is designed for teachers of English, using a competency-based approach in education.

The UNESCO ICT-CFT document describes a module principle of teacher training course design. The presented course implements all the three competency-oriented approaches.

### First aspect: Technology Literacy

The aim of the course is to train teachers to be able to use ICT in education process both in the classroom and outside the classroom through students' extra-curriculum independent work. Other objectives of the course are: to provide education services to a greater number of teachers, to provide all citizens access to high-quality education resources, and to raise teachers' literacy, including computer literacy.

The course implements the following modules of the first aspect:

MODULES	TEACHER COMPETENCIES
MODULE 1 UNDERSTANDING ICT IN EDUCATION	Teachers develop knowledge education policy and an understanding of why pedagogical practices learnt correspond to this policy, and implement it.
MODULE 2 CURRICULUM AND ASSESSMENT	Teachers study education standards and requirements to assessment of education results in their subject area. In addition, the training course forms the ability to integrate ICT tools in professional activities.
MODULE 3	Teachers study and acquire analytical and practical skills of rea-

PEDAGOGY	sonable use of ICT in educational activity at different stages of the education process.
MODULE 4  ICT	<p>Teachers master basic techniques of using software, which increases the effectiveness of learning and developing skills of computer communication. The themes learnt are:</p> <ul style="list-style-type: none"> <li>• Internet. Internet services. Search and publication of information on the Internet.</li> <li>• Network technologies. Main trends in the development and application of ICTs in teaching English.</li> <li>• Didactics of creation and use of learning tools designed on the basis of ICTs.</li> <li>• Technologies of computer testing, processing and interpretation of test results. Distance education technologies. Specialized Internet sites as the instrument of methodological support of the education process.</li> </ul>
MODULE 4  ICT	Teachers learn software, raising learning efficiency and teaching productivity, as well as acquire practical skills to use them.
MODULE 5  ORGANIZATION AND ADMINISTRATION	Teachers acquire skills to organize and use various teaching methods using ICT; e.g., using ICT to work with the whole class, in small groups, and building students' individual learning path.
MODULE 6  TEACHER PROFES- SIONAL LEARNING	Teachers acquire the ability to use ICT, get acquainted with web resources and collections of digital education resources for teaching English, and acquire skills to choose additional training materials to use in the education process and their further professional

	development.
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### **Second aspect: Knowledge deepening**

The strategic goal of this aspect is to raise education effectiveness, forming the ability of students to apply the knowledge obtained in school to solve complex problems encountered in the real world.

MODULES	TEACHER COMPETENCIES
MODULE 1 UNDERSTANDING ICT IN EDUCATION	Teachers acquire abilities to develop, modify, and implement pedagogical practices that support the education policies and social priorities.
MODULE 2 CURRICULUM AND AS- SESSMENT	Teachers improve their subject area knowledge and develop the ability to flexibly apply this knowledge in a variety of situations.  The course provides teachers with the ability to formulate complex problems of students' language competencies development, which allows to evaluate the importance and value of mastering a foreign language in modern world.  The course provides teachers with the ability to find the most effective and up-to-date instruments for the development of students' speaking skills and competencies by means of ICT, especially in regards to forming socio-cultural competency, collaborative working skills, and using ICTs as an instrument of communication and self-education.
MODULE 3	Teachers are taught to work using innovative methods, which

PEDAGOGY	<p>change the teacher's role from knowledge transfer to learning supervision when students are taught to search, evaluate, and process information on their own. Education in this approach is personality-oriented. The teacher guides the work of students to deep exploration of the material and supports collaborative learning projects, helping students to develop, implement, and monitor implementation plans and obtained results of training projects.</p> <p>Teachers acquire the ability to use assessment methods as basic tools to guide their work.</p>
MODULE 4 ICT	<p>Teachers explore various ICT and Internet resources and tools; they acquire practical skills for their integration into the education process.</p>
MODULE 5 ORGANIZATION AND ADMINISTRATION	<p>Teachers are trained to create a flexible learning environment in and outside of the classroom aimed at personality-oriented teaching.</p> <p>Theachers are trained to use ICT tools for organization of student collaboration and for communication with the students' parents.</p>
MODULE 6 TEACHER PROFES- SIONAL LEARNING	<p>Teachers acquire practical skills for collaboration with other teachers and use of professional computer network communities to acquire information, communicate with colleagues and external experts, as well as to pursue their own professional development.</p>

### Third aspect: Knowledge creation

The strategic goal of this approach is to increase productivity by creating a workforce that is continually engaged in, and benefits from, knowledge creation and social, economic, and cultural development of the country.

MODULES	TEACHER COMPETENCIES
MODULE 2  CURRICULUM AND AS-  SESSMENT	Teachers learn about the complex nature of human development, including cognitive, psychological, emotional, and physical development of students. Teachers learn to analyse conditions in which students learn better. Teachers develop their ability to build student's necessary skills to live in information society, such as: <ul style="list-style-type: none"> <li>• problem solving</li> <li>• ICT-supported communication</li> <li>• collaborative work</li> <li>• critical thinking</li> </ul>
MODULE 3  PEDAGOGY	Learning to work with the use of ICTs, the teacher acquires the ability to demonstrate modern and effective teaching and learning methods, and to create educational situations in which students can use their evolving abilities.
MODULE 4  ICT	Teachers are trained to work in an ICT-rich environment and use ICTs for the development of students' skills to create knowledge. They teach students to create and to use personal education

	space using ICT and Internet tools for self-learning and mastering lifelong learning skills.
MODULE 6 TEACHER PROFESSIONAL LEARNING	Teachers are trained to use ICT and professional learning communities aimed at obtaining new knowledge through Internet resources and collections of electronic educational resources, methods of work in a virtual education environment. They learn to create a customized learning environment and learn techniques to work in it.

Thus, the course Programme “The use of information and communication technologies and Internet tools in teaching English” meets the UNESCO ICT-CFT requirements. The course objectives are formulated in such a way that they can be solved in the course of professional teacher development and, at the same time, they are directly related to the teachers’ everyday professional tasks. The blended format of training allows teachers to master the studied methods in practice.