



**Executive Direction of
Multivendor and Academic ICT Consortium
Bauman Moscow State Technical University**



INTEGRATING VENDORS OFFICIAL COURSES INTO UNIVERSITIES' IT CURRICULUMS

**Встраивание сертификационных курсов
ИТ-компаний в образовательные программы
вузов и колледжей**

Andrey Philippovich
PHD, Prof., Vice-director

Almaty – 5th December 2013

Andrey Philippovich

- **Chief of Laboratory of IT Education "CLAIM Consulting"**
- **Chief Executive Deputy of MAC ICT, expert of The Ministry of education and science, expert of UNESCO Institute for IT in Education**
- **IT-education consultant**
(30+ projects)



- **Ph.D., Prof. of Bauman Moscow State Technical University**
Courses: Artificial Intelligence, Computational linguistics and Semiotics, Architecture of Information systems, Design IT-Curriculums
- **Chief of Scientific & Educational Cluster CLAIM**
(Computational Linguistics, Artificial Intelligence, Multimedia and more)
- **Member of Leading Scientific School of Russia**
"Russian Language Person" (Head of School - Jury Karaulov)





Members of the Multivendor and Academic ICT Consortium (64)



Academic (25)

- ВГСА
- ВГУ
- ВолгГТУ
- ВятГУ
- ЕОИ
- Информика
- КубГУ
- МГТУ им. Н.Э.Баумана
- МГТУ «Станкин»
- МИИТ
- МИРЭА
- МТУСИ
- МФПА
- МФЮА
- МЭИ
- МЭСИ
- ПетрГУ
- ПГЛУ
- СГУ
- СПбГИТМО
- СПбГУП
- СПбГУТ
- ТамбГТУ
- ТГТУ
- ЮФУ

Russian vendors (9)

- 1С
- 1С-Битрикс
- ADEM
- АСКОН
- Лаборатория Касперского
- НаноСофт
- СПРУТ-Технология
- SolidWorks
- Топ Системы

Foreign vendors (13)

- Adobe
- Autodesk
- Cisco
- Embarcadero
- EMC
- HP
- IBM
- Microsoft
- National Instruments
- Oracle
- PTC
- Red Hat
- SAP

System integrators, Training centers, professional associations, etc. (17)

- АП КИТ
- ТК №461 (ИКТО)
- Аквариус
- ЦИПК Атомэнергопром
- УЦ "Специалист"
- Pro-Technologies
- Quarta technologies
- VDEL
- VP Group
- ИНТЕГРА-С
- Компьютерная Самара
- Ланит
- Софтлайн
- БИНОМ
- СТЭП ЛОДЖИК
- ДПИ-компьютерс
- МНПП "НАМИП"



MULTIVENDOR AND ACADEMIC ICT CONSORTIUM - MAIN GOALS

- Creating the platform for efficient multi-stakeholder partnership of government, universities, vendors and employers in the field of ICT-education



- Integration of vendor-based and traditional academic education systems

- Adaptation international standards and curriculums in the field of ICT

- Development recommendation on improvement the national professional and educational standards

- Fostering the development information society in Russia

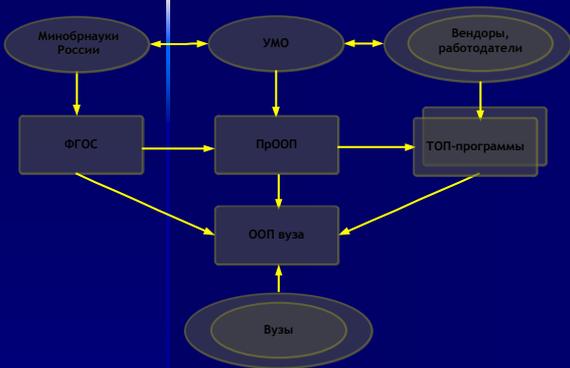


MAC ICT – Main methodical projects

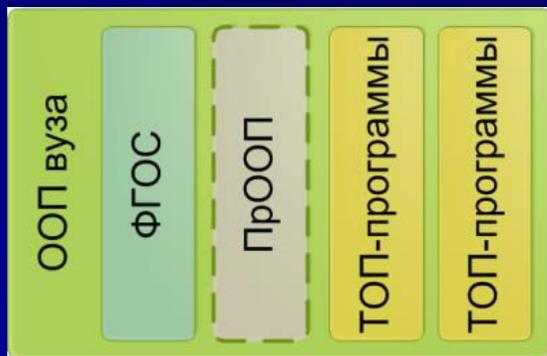


- **SIOR ICT** – Open framework for integration vendors educational courses and assets into universities' curriculums in the field of ICT
- **NPSQ-ICT:** National system of professional qualifications in the field of ICT based on professional standards and vendor certifications
- **ICT-GRIFFE:** Validating educational literature in the field of ICT
- **CERT ICT** – National System of professional certification in the field of ICT based on professional standards
- **NSQ&C ICT** – National system of Qualifications and Competencies in the field of ICT, Adaptation the European e-Competence Framework
- **TUNING Russia** – Matching Russian and European curriculums and educational standards in the field of ICT
- **ICT-CFT Russia** - Analysis teacher training programmes and courses implementing in Russia for compliance with UNESCO ICT-CFT
- **PS ICT 3.0** – Design new generation of national professional standards in the field of ICT (Professional standard of Digital Media Specialist)
- **WS ICT Russia** - Design educational modules and curriculums based on requirements of WorldSkills initiative

Open framework for integration vendors' educational courses into universities' IT curriculums (SIOR ICT)



- Using Federal State Educational Standards (FSES) is the main condition for getting Government finances
- FSES is a frame of Syllabus and have "empty slots"
- Many universities don't know how to fill these slots with actual and modern educational content
- TOP-curriculums (typical educational program) are:
 - created by vendors and companies
 - based on professional standards or industrial certifications
 - written by «academic language»
 - correlated with FSES requirements
 - recommended by IT-industry and professional associations
 - recommended by Educational and Methodical Unions





Integrating CNA courses into Russian technical universities' IT curriculums



А.Ю. Филиппов
С.В. Овсянников

ТИПОВАЯ ОБРАЗОВАТЕЛЬНАЯ ПРОГРАММА

ОСНОВЫ ИКТ
И СЕТЕВОЕ АДМИНИСТРИРОВАНИЕ



Код	Название направления ФГОС ВПО
230000	Информатика и вычислительная техника
230100	Информатика и вычислительная техника
230400	Информационные системы и технологии
230700	Прикладная информатика
231000	Программная инженерия
231300	Прикладная математика
230000	Автоматизация и управление
220100	Системный анализ и управление
220400	Управление в технических системах
220700	Автоматизация технологических процессов и производств
221000	Мехатроника и робототехника
010000	Физико-математические науки
010200	Математика и компьютерный язык
010300	Фундаментальная информатика и информационные технологии
010400	Прикладная математика и информатика
010500	Математическое обеспечение и администрирование информационных систем
Ж00000	Другие группы направлений
210700	Информационные технологии и системы связи
090500	Информационная безопасность
080500	Бизнес-информатика

- TOP-curriculum - educational and methodical complex for integration Cisco Networking Academy courses into IT curriculums based on Federal State Educational Standards (FSES):

- List of professional competencies
- Sets of knowledge, know-how and skills
- Approximate Syllabus
- Educational & methodical recommendations based on CNA materials
- Stuff requirements, etc.



- TOP-curriculum is recommended by Educational and Methodical Union Of Polytechnic University Education in Russia and other key organizations in ICT education
- Easy to implement - «copy-paste» and «all-inclusive» principles correlated with FSES requirements

Federal State Educational Standards in the field of ICT (20+)

→ Таблица 1 – Рекомендуемые для встраивания ИТ-направления ФГОС

Код ФГОС	Название направления ФГОС бакалавриата, специалитета и магистратуры	Коды профессиональных компетенций (ПК)
230000	Информатика и вычислительная техника	
230100	Информатика и вычислительная техника	2-5
230400	Информационные системы и технологии	11, 12, 15, 29, 30, 34
230700	Прикладная информатика	4-7, 9-11, 17, 21
231000	Программная инженерия	1, 2, 6, 10, 18, 23
231300	Прикладная математика	сравнение не проводилось
220000	Автоматизация и управление	
220100	Системный анализ и управление	13, 14
220400	Управление в технических системах	
220700	Автоматизация технологических процессов и производств	сравнение не проводилось
221000	Мехатроника и робототехника	
010000	Физико-математические науки	
010200	Математика и компьютерные науки	сравнение не проводилось
010300	Фундаментальная информатика и информационные технологии	1-3, 18, 19, 23
010400	Прикладная математика и информатика	1, 9, 10
010500	Математическое обеспечение и администрирование информационных систем	8, 11, 14, 21, 24, 25, 27, 28, 36
XX0000	Другие группы и направления	
210700	Инфокоммуникационные технологии и системы связи	1, 2
080500	Бизнес-информатика	15-18
090900	Информационная безопасность	2, 15, 16

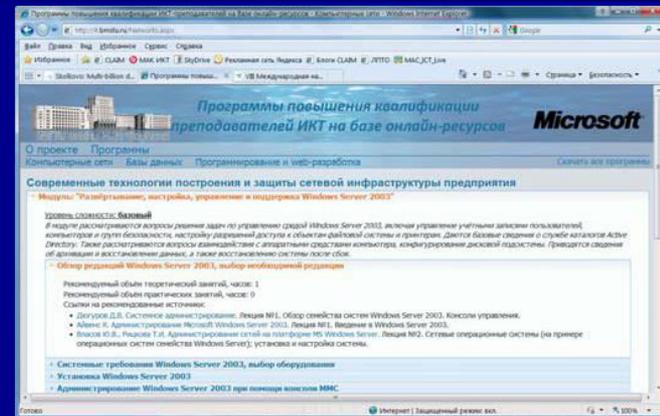
- informatics and computer science
- Information systems and technologies
- Applied Informatics
- Software engineering
- System analysis and
- Computer science
- Telecommunications
- Information security
- Business-Informatics
- etc.



Vocational educational programs for ICT-teachers based on Microsoft free online resources

Main directions:

- Design web-applications
- Design, administration and secure networking infrastructure
- Design and administration database management systems and business intelligence



Programs characteristics:

- Duration - 72 hours
- Module structure, 3 levels of difficulty
- Recommended by Educational and Methodical Union Of Polytechnic University Education in Russia

Main resources:

- MSDN Academic Alliance library
- Video presentations TechDays.ru
- Courses of Internet-university in the field of ICT (intuit.ru)





TOP-curriculums and EMU recommendations for integration Microsoft free online resources

ПК-1	понимание основных концепций, принципов, теорий и фактов, связанных с информатикой			
ПК-2	способность к формализации в своей предметной области с учетом ограничений и использованию методов исследования			
ПК-3	готовность к использованию методов и инструментальных средств исследования объектов профессиональной деятельности			
ПК-4	готовность обосновать принимаемые проектные решения, осуществлять по плану и выполнение экспериментов по проверке их корректности и эффективности			
ПК-5	умение готовить презентации, оформлять научно-технические отчеты по результатам выполненной работы, публиковать результаты исследований в виде статей и докладов на научно-технических конференциях			
ПК-6	способность формализовать предметную область программного проекта и разработать спецификацию для компонента программного продукта			
ПК-7	способность выполнить начальную оценку степени трудности, риска, затрат и сформировать рабочий график			
ПК-8	способность готовить коммерческие предложения с вариантами решения			
ПК-9	знакомство с архитектурой ЭВМ и систем			
ПК-10	умение применять основы формализации и программирования к проектированию, конструированию и тестированию программных продуктов			?

- TOP-curriculum «Microsoft technologies for Network Infrastructure Planning and Design»
- EMU recommendations for integration Microsoft free online resources into universities' IT curriculums based on FSES
- Web-navigator and curriculum constructor based on Microsoft free online resources

Модули Т О П-программы	Компетенция / Технология	Уровневые компетенции	Код
Развёртывание, настройка, управление и поддержка серверной ОС (Windows Server)	Способность осуществлять развёртывание, настройку, управление и поддержку серверной ОС Windows Server и проектирование инфраструктуры службы каталогов Active Directory	Способность осуществлять типовые операции по развёртыванию, настройке, управлению и поддержке серверной ОС Windows Server и проектированию инфраструктуры службы каталогов Active Directory	TK-1
Развёртывание, настройка, управление и поддержка инфраструктуры Active Directory (на базе серверной ОС Windows Server)		TK-3	
Планирование и внедрение инфраструктуры Active Directory на базе Windows Server		TK-5	

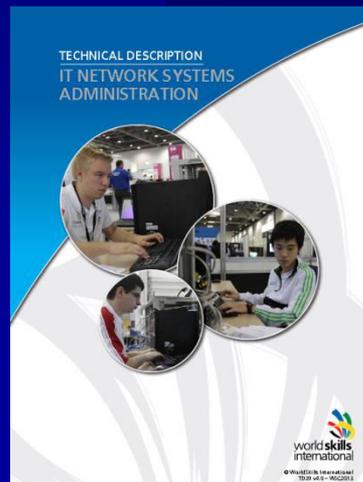
TOP-curriculum "Developer 1C"



- developed in 2013 on the basis of the 8 official certification courses of famous Russian IT-company "1C"
- it lasts approximately 10 credits (ECTS) ~ 360 hours
- prepares for professional certifications "1C: Professional" and "1C: Specialist"
- includes the following subjects:
 - Basics of programming and configuration in Enterprise Resource Planning (ERP) systems;
 - Complex automation based on ERP-system;
 - Databases, SQL and data exchange in ERP-systems.



WorldSkills Educational Modules in the field of ICT



- Russian Federation - new member of WorldSkills International
- WorldSkills Russia & Ministry of education and science launch methodical project for designing educational modules and curriculums based on requirements of WorldSkills initiative
- ICT skills - Information Network Cabling, **IT Network Systems Administration**, IT Software Solutions for Business, Print Media Technology, **Web-Design**
- IT Network Systems Administration – **CCNA Routing and Switching, CCNA Security, CCNA Voice, MCITP Enterprise and Server Administrator on Windows Server 2008, RedHat Certified Engineer (RHCE)**

Code	Competency
ADM	Administrating operation systems
NET	Designing and maintaining computer networks
VOIP	Designing and maintaining VOIP
NSEC	Networks security

SIOR ICT – FIRST RESULTS (2011 – 2013)

- **TOP-CISCO:** Integrating Cisco Networking Academy courses into Russian technical universities' IT curriculums
- **MS2T-ONLINE:** Vocational educational programs for ICT-teachers based on Microsoft online resources
- **TOP-MS:** TOP-curriculums and EMU recommendations for integration Microsoft free online resources
- **TOP-1C:** TOP-curriculums and EMU recommendations for integration 1C-company certified courses
- **TOP-WS-WEB:** Design educational modules and curriculums based on requirements of WorldSkills initiative (Web-Design)
- **TOP-WS-SA:** Design educational modules and curriculums based on requirements of WorldSkills initiative (IT Network Systems Administration)
- **TOPs: Unesco ICT-CFT, EMC, INTEL, AUTODESK , MS DYNAMICS, EMBARCADERO** -- projects are discussed...



SIOR ICT – FIRST RESULTS (2011 – 2013)



- Cisco TOP-curriculum was introduced in **25+ universities** in Russia. Every year on courses of the curriculum are being trained more than **7,000 students**
- Modules of Microsoft TOP-curriculum and recommended educational content embedded in more than **150 training courses**, and for two years it held more than **18,000 student-courses**
- TOP-curriculum "Developer 1C" - During the summer months have been trained over **280 teachers from 70+ universities**.
- The best practices of TOP-curriculum and its methodology have used in international project "**Tuning Russia**" (subject area – ICT)
- Presidium of the Coordination Council of all Educational and Methodical Unions of Russian universities has **recommended TOP-curriculum for replication in different subject areas** (not only in ICT domain)
- The principle of integration of professional and educational standards of Russian Federation, first proposed and approved in the TOP-curriculums has been taken as a **basis in the new version of Federal State educational standards**.





International project - Adaptation the European e-Competence Framework

Европейский опыт реализации политики развития ИКТ-компетенций
Европейская рамка ИКТ-компетенций
Вольян Н.С.

- Work group: Softline, MAC ICT, CEN Workshop on ICT Skills, Federal Agency for technical regulations and metrology (FA TRM), Russian Union of CIO (SoDIT), G2C project, etc.
- Russian translation of eCF standards (CEN Workshop Agreements) are registered in Federal Agency for technical regulations and metrology
- Created Technical Standardization Committee «E-competencies»
- Russian version on EU website - <http://www.ecompetences.eu/>

Области компетенций	Уровни применения компетенций				
	←1	←2	←3	←4	←5
А. ПЛАНИРОВАНИЕ					
Компетенция 1					
Компетенция 2					
В. ВНЕДРЕНИЕ					
С. ЗАПУСК					
Д. АДАПТАЦИЯ					
Е. УПРАВЛЕНИЕ					

Директор 3
Область компетенций

Директор 3
Уровни применения компетенция

Директор 2
Перечень компетенций

Директор 4
Процесс поддержания компетенций

Welcome to the European e-Competence Framework

A common European framework for ICT Professionals in all industry sectors

The European e-Competence Framework (e-CF) is a reference framework of 36 ICT competences that can be used and understood by ICT user and supply companies, the public sector, educational and social partners across Europe. The framework provides an international tool for:

- ICT practitioners and managers, with clear guidelines for their competence development.
- Human resources managers, enabling the anticipation and planning of competence requirements
- Education and training, enabling effective planning and design of ICT curricula
- Policy makers and market researchers, providing a clear and Europe-wide agreed reference for ICT skills and competences in a long-term perspective
- Procurement managers, providing a common language for effective technical terms of reference in national and international bids.

The European e-Competence Framework has been developed in the context of the [CEN workshop on ICT Skills](#).

European e-Competence Framework 2.0 for download
The CEN Workshop Agreement "European e-Competence Framework 2.0", consisting of the

ГРУППЫ CEN

Европейская рамка ИКТ-компетенций 2.0
Часть 1. Общая европейская рамка компетенций ИКТ-специалистов для всех секторов индустрии

ЗАРЕГИСТРИРОВАНО
Федеральное агентство по техническому регулированию и метрологии
ФГУП «СТАНДАРТИНФОРМ»
Номер регистрации: 5690/СВА
Дата регистрации: 28.07.2011

Центр компетенции: Аннинский 17, 8-1000 Вольск

ICT Professional Standards 3.0 - Web content specialist (2013)



International webmasters association Web Skills Profiles - 2013

- wsp-g3-001. Community manager
- wsp-g3-002. Web project manager
- wsp-g3-003. Web account manager
- wsp-g3-004. User experience designer
- wsp-g3-005. Business analyst
- wsp-g3-006. DB administrator
- wsp-g3-007. Search engine expert
- wsp-g3-008. Advertising manager
- wsp-g3-009. Frontend web developer
- wsp-g3-010. Server side web developer
- **wsp-g3-011. Web content specialist**
- wsp-g3-012. Web server administrator
- wsp-g3-013. Information architect
- wsp-g3-014. Digital strategic planner
- wsp-g3-015. Web accessibility expert
- wsp-g3-016. Web security expert
- wsp-g3-017. Mobile application developer
- wsp-g3-018. E-commerce specialist
- wsp-g3-019. Online store manager
- wsp-g3-020. Reputation manager
- wsp-g3-021. Knowledge manager

European ICT Professional Profiles (Generation 2)	IWA Professional Profiles for the Web (Generation 3)
Project Manager	Web Project Manager
Account Manager	Account
Digital Media Specialist	User Experience Designer
Digital Media Specialist	Search Engine Optimizer
Digital Media Specialist and/ or Developer	Front-End Web Developer
Digital Media Specialist	Web Content Manager
Database Administrator	DB Administrator
Systems Administrator	Web Server Administrator

**Correlated with eCF
2.0, CWA 16458**



ICT Professional Standards 3.0 - Web content specialist (2013)



Qualifications levels and positions (roles)

- **A. Poster (Публикатор, оператор ввода, наборщик текста)**
Техническая обработка информационных ресурсов (контента) и размещение на веб-сайте
- **B. Web-writer, Moderator (Веб-писатель, контент-редактор, модератор, веб-райтер, рерайтер, копирайтер, автор статей)**
Создание и редактирование информационных ресурсов
- **C. Content manager (Контент-менеджер)**
Управление (менеджмент) информационными ресурсами
- **D. Information Architect (Информационный архитектор)**
Оптимизация и проектирование информационной архитектуры сайта
Уровень не включен в ПС, т.к. почти нет вакансий на рынке труда и его функции ближе к ЕСМ.

National System of professional certification in the field of ICT



EUCIP ACCREDITED COURSES (sample)	EUCIP ELECTIVE PROFILES (sample)		NETWORK MANAGER
E0000 EUCIP CORE		...	
E1001 A. Plan		X	X
E2001 B. Build		X	X
E3001 C. Operate		X	X
E3100 EUCIP IT ADMINISTRATOR			
E3101 1. Hardware			D 2/8
E3102 2. Operating Systems			B 4/4
E3103 3. LAN & Network Services			C 5/5
E3104 4. Network export use			E 5/5
E3105 5. IT Security			F 6/6
E3106 6. Network Design			D 6/8
I6101 ITIL Foundations (by EXIN or equivalent by ISEB)			A 2/2
U1002 Univ. Information Systems			A 2/2
U3001 Univ. Telecommunication Networks			E 5/5
U3002 Univ. Operating Systems			C 5/5
U3003 Univ. IT Security			F 6/6
V4100 Cisco Networking Academy			
V1112 CCNA1 + CCNA2			C 5/5 E 5/5
V1134 CCNA3 + CCNA4			D 8/8
V1003 Cisco Wireless LAN Support Specialist			D 2/8

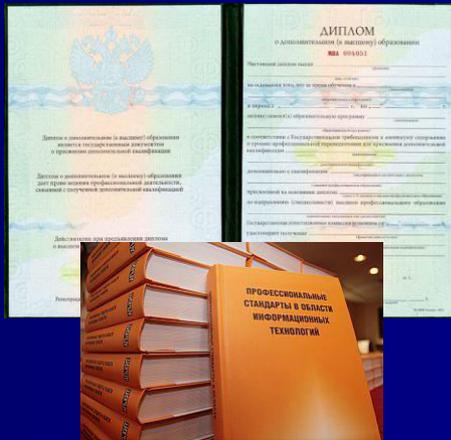
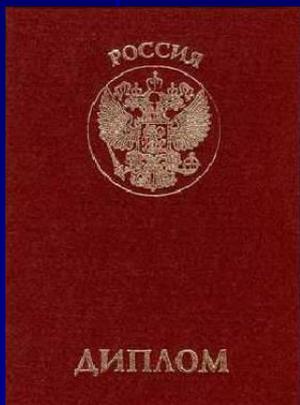
- Based on professional standards
- Correlated with international frameworks and standards
- Corresponded with vendor-based and vendor-neutral certifications
- Oriented for formal, non-formal and informal education
- Accreditation educational programs in the field of ICT



National system of professional qualifications in the field of ICT



- Russian bachelor and master programs based on Federal State educational standards (FSES)



- Formula of professional qualifications (PQ) :
Specialist = bachelor diploma (240 Cr) + PQ (30-60 Cr.)
Prof. standard or Vendor certification => TOP-Curriculum



Validating educational literature in the field of ICT



Учебно-методическое объединение вузов по университетскому политехническому образованию

Microsoft | IT Academy Program

ВНЕДРЕНИЕ ОФИЦИАЛЬНЫХ АКАДЕМИЧЕСКИХ УЧЕБНЫХ ПОСОБИЙ MICROSOFT В ИТ-ПРОГРАММЫ ТЕХНИЧЕСКИХ ВУЗОВ

А.Ю. Филиппович
С.В. Коршунов

ЭКМ

International and Methodical Union of Technical Universities in Russian Federation

Microsoft | IT Academy Program

INTEGRATING MICROSOFT OFFICIAL ACADEMIC RESOURCES INTO RUSSIAN TECHNICAL UNIVERSITIES' IT CURRICULUMS

Andrey Philippovich
Sergey Korshunov
Nadezhda Volpian

俄罗斯科学教育部
高等学校教学方法联合会

Microsoft | IT Academy Program

微软授权课程在俄罗斯高等理工学院信息技术课程中的应用

菲利浦维奇·安德烈
科尔舒诺夫·谢尔盖
瓦丽宾·娜杰日达

New system of validating:

- Integration of griffes of all EMUs in the field of ICT
- Based both on educational (FSSES) and professional standards (PS 3.0)
- Experts from Universities & Business
- Competency model of educational literature (textbook)
- Crowdsourcing technology for assessment

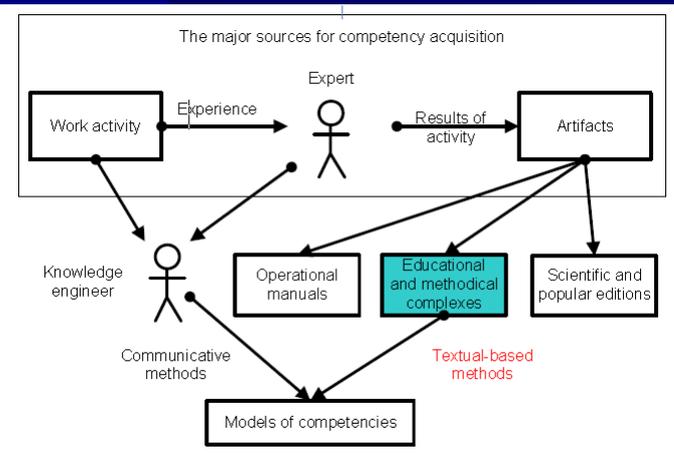
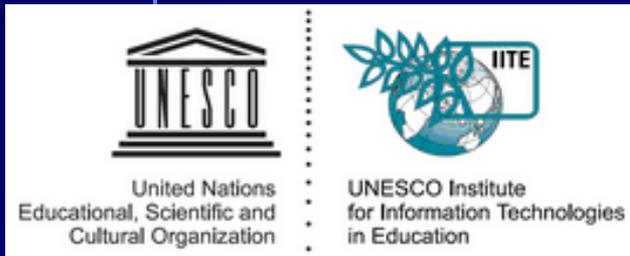


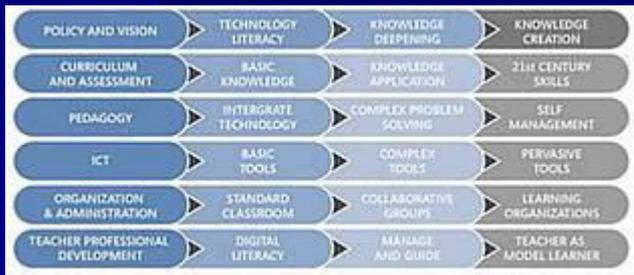
Table 20. Calculation of credits in favor of university course

Course	Credit	% topics coincidence	Depth description	Share of MOAC credits
Operating systems	3.6	10%	1	0.36
Administration in information systems	2.8	80%	0.5	1.12
System software: OS section	1.8	80%	0.5	0.72

MAC ICT & UNESCO IITE



- Memorandum of understanding between UNESCO IITE and MAC ICT
- Analytical survey of teacher training programmes and courses implementing in RF and analysis for compliance with **UNESCO ICT-CFT**.
- Fostering the development of the international initiative **CDIO** («Conceive - Design - Implement – Operate»)»





More information...



Web

- MAC ICT Website
<http://facebook.com/MAC.ICT>
- Website of Laboratory of Technical Education BMSTU
<http://technical.bmstu.ru/LTEP/>

Press

- Rubric «ICT in Education», Magazine «Quality of Education» (From 2009, 20+ issues)
<http://technical.bmstu.ru/LTEP/Digest.htm>
- Special edition - MAC ICT history, projects, review of international experience in ICT-education, etc.
<http://technical.bmstu.ru/LTEP/Projects/Vestnik>



Contacts



ANDREY PHILIPPOVICH

**Ph.D., Prof., Chief Executive Deputy of MAC ICT,
Chief of Laboratory of IT Education "CLAIM Consulting"
Bauman Moscow State Technical University**

Personal page - <http://it-claim.ru/andrey>

FB-page - <http://facebook.com/aphilippovich>

twitter – http://twitter.com/A_Philippovich

