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COMPUTER SCIENCE EDUCATION: TODAY AND TOMORROW

Nowadays, educational process in a modern university is getting much more diversified. Speaking about computer science in particular, we live in the age of fast-growing technological progress, involving the hardware and software development of the computing devices. Such a scientific revolution causes widening the areas of computing applications and growing the demands for their scalability. This means that lots of solutions of yesterday has become no more actual for solving the same typical present-day tasks. The traditional educational methods, as of prefetching all the courses ahead, are getting useless. The tutor must accommodate the science volatility in their particular branch to catch its best solutions in present.

Another factor is a big diversity of equipotential technologies, which can be applied to implement the same single task. Making the choice about the best technology for a particular solution of a typical task, is also lain on a tutor. This choice is a result of deep learning of the feedback from existing applications and personal experience. A bit of “sixth sense” is needed for this, when the scientific task is something really new and wasn't solved before.

All the learning can be easily done by means of mining the information via the search engines. Internet is developed enough to hold either all the needed information or the reasonable hints for its retrieval.

Thus, the tutor is no more just a narrator who keeps the planned prefetched course, but an expert who is capable of choosing the right direction of studying on-the-fly. Now the tutor has to deliver the actual information on studying technology, explain the advantages and disadvantages of each technique and develop in students a sense of choice, so they can estimate the power of different methods for solving their real tasks in future. The first step of such an education is teaching the students to optimally use the search engines in a branch of their science and to filter the useful information within the tons of articles and feedback.

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IMPROVEMENT OF TEACHING QUALITY ON CYBERSECURITY COURSES

Rapid expansion of information technologies raised a problem of appropriate level of information security ensuring. In real life people use electronic services of private companies, pay for the services by transferring money from one virtual

account to another. This caused a great interest of intruders which try to illegally seize material resources. Intruders use different security flaws in modern hardware and software. Brightest example is the latest problem with openssl library - «Heart Bleed»[1]. Mainly this type of security issues are caused by complexity of modern systems – developer cannot predict behavior of his system in different boundary conditions and software or hardware bugs remain unnoticed. Security problems can also be caused by “back doors” which have been consciously left by developer or manufacturer [2] of information system.

Nowadays information security problems rise to the level of interstate relations. Danger of a cyber-attack is so close to military armed aggression when aggressor can destroy all infrastructure of his victim. Viruses, worms, botnets can play a role of heavy weapons or spy technologies [3] of some enemies. In this case not only private persons or forger gangs participate in this attack but also their special cyber forces of different countries.

Ukrainian national standardization procedure of information system security doesn't guarantee resilience to security attacks. Likewise attacks cannot be prevented by criminal and administrative penalties as there are gaps in Ukrainian legislation. Another important problem is an insurance of person data privacy. International companies collect personal data by social networks or other web-services for their own, and not always honest purposes. Also these collected data can be stolen by forgers and used in criminal activity.

The above mentioned facts underline importance of cybersecurity courses delivered for specialties «Computer science» and «Computer engineering». On the author's point of view modern Western education system which is imposed in Ukraine now is oriented on acquisition of practical skills and mainly educating and molding specialist in particular field. Old soviet education system was oriented on acquiring fundamental knowledge which was less practical sometimes. Main advantage of the former approach is getting ready to use specialist, main advantage of the latter is ability to think and analyze. Conversely disadvantage of the first approach is that students mainly are not able to deepen analytical thinking and understanding of underlying processes. Disadvantage of the second is resulting low practical skills of a student. Now Ukrainian higher education system is in the middle between these two systems and teaching process incorporates bad features of each system. Thus the main goal of educational process organization and planning is a combination of the best features of modern Western and old soviet education systems: training of specialists who will have the ability to invent, design and develop new ideas which constitute the background of new IT-technologies.

Authors have an experience in delivering special refresher courses on information security for international students from Vietnamese company «Hitaco»; special refresher courses on network information security for Ukrainian frontier troops; «Complex Information Security» course for students studying for master's degree and a number of courses devoted to cybersecurity. Authors participated in scientific projects dealt with parallel and distributed computing for purposes of

cryptanalysis during 2008-2013. Some principles of teaching quality improvement were presented in [4,5]. In addition to these principles a few others will be presented below:

1. *To participate in international educational initiatives* like Tempus [6]. Tempus - the European Union's Program for the University Studies is an external program of the EU that supports modernization of higher education systems in the EU partner countries and neighbouring states. Today this program is open for countries of Eastern Europe, Central Asia, Western Balkans, North Africa and the Middle East. Authors of this report are participating in project TEMPUS №543968 «Modernization of Postgraduate Studies on Security and Resilience for Human and Industry Related Domains» (short name – SEREIN) according to three year program (01.12.2013-01.12.2016). For educational institutions it is also ability to upgrade laboratory infrastructure and improve syllabus.

2. *To participate in international scientific initiatives* like Horizon 2020 [7]. Horizon 2020 is the biggest EU Research and Innovation program ever with nearly €80 billion of funding available over 7 years (2014 to 2020) – in addition to the private investment that this money will attract. It promises more breakthroughs, discoveries and world-firsts by taking great ideas from the lab to the market. Horizon 2020 is the financial instrument implementing the Innovation Union, a Europe 2020 flagship initiative aimed at securing Europe's global competitiveness. By coupling research and innovation, Horizon 2020 is helping to achieve this with its emphasis on excellent science, industrial leadership and tackling societal challenges. The goal is to ensure Europe produces world-class science, removes barriers to innovation and makes it easier for the public and private sectors to work together in delivering innovation.

3. *To participate in development and modernization of state security standards.* Every country has its own security standards which conform to international standards. Nowadays Ukrainian state security certification [8] conform to international standards just partially and generally doesn't guarantee resilience to cyber-attacks. This type of activity is associated with development of information security state doctrine.

4. *To popularize basic knowledge on cybersecurity and culture of information technologies usage.* Popularization of understanding of role of information security is problem of great importance, because it prevents the simplest attacks on ordinary citizens like electronic payment card manipulations, social engineering attacks, theft of personal data privacy and confidentiality, criminal acts with cell phones and others. Popularization can be done by holding open lectures, webinars, interviews in mass media, thematic channel on YouTube and web-sites.

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ВИКОРИСТАННЯ ІКТ НА УРОКАХ ДИСЦИПЛІНИ «ОСНОВИ ІНФОРМАТИКИ ТА ОБЧИСЛЮВАЛЬНОЇ ТЕХНІКИ»

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IN-CLASS USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES IN DISCIPLINE “FUNDAMENTALS OF INFORMATICS AND COMPUTER ENGINEERING”

У наш час швидко відбувається процес інформатизації суспільства, що відображається в особистому, навчальному, професійному житті людини.