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ACTUAL PROBLEMS OF EDUCATION

(Competence-oriented Approach – iSECRET Results Dissemination)

(MIP 2017)

1–2 June, 2017

ABSTRACTS

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Abstracts of the International Scientific and Educational Conference *ACTUAL PROBLEMS OF EDUCATION (Competence-oriented Approach – iSECRET Results Dissemination)* (MIP 2017), 1–2 June 2017, Riga, Latvia.

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ACTUAL PROBLEMS OF EDUCATION
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FOREWORD

A regular collection of the materials of the Conference “Actual Problems of Education (Competence-oriented Approach – iSECRET Results Dissemination)” MIP 2017 contains the abstracts recommended for publication by the Programming Committee. The authors of these abstracts are the academic staffs and other employees of different higher education institutions as well as the representatives of the partner organisations participating in the Conference. The abstracts and presentations concern both the problems of improving the quality of the education process on the basis of the latest pedagogical and information technologies and the issues of preparing future specialists and updating the content of the delivered disciplines with the aim of their orientation to the requirements of the present labour market of Latvia and Europe. The collection has retained the authors’ style and the original layout of the presented materials.

The MIP 2017 conference is a part of the project “Implementation of Software Engineering Competence Remote Evaluation for Master Program Graduates (iSECRET)” run by TTI, contract No. 2015-1-LV01-KA203-013439, co-financed by EC ERASMUS+ program.

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ERASMUS+ iSECRET PROJECT: STATUS AND MAIN RESULTS

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Keywords: Education outcome, software engineering competence evaluation Internet portal, European e-Competence Framework (e-CF)

The project aims to foster interchange and cooperation between education and training systems within the EU (e-CF, 2016). The iSECRET project will reinforce and accelerate the process of innovation in HE by enhancing universities' capabilities by granting better access to the educational know-how as OER, setting an effective experimental framework for defining and measuring educational outcome for the selected Master's programmes in SE&ST at European and Baltic regional levels (Misnevs, 2015).

The partnership of 6 organizations from 6 countries used to implement the iSecret project:

WSG – University of Economy in Bydgoszcz (Poland)
KTU – Kaunas Technological University (Lithuania)
UM – University of Murcia (Spain)
TEIEP – Technological Educational Institute of Epirus (Greece)
UP – Plovdiv university (Bulgaria)
TSI – Transport and Telecommunication Institute (Latvia).

Expected results of the projects are the following: creation of operational prototype of Internet Portal (SECEIP) for competence evaluation and certification of SE&ST Master program's graduates; design of the Basic ECTS oriented framework applicable for Joint Master programs in SE&ST implementation and assessment; demo example of SE&ST Master program's education outcome (competence) definition in terms of e-CF freely accessible for European educational community as OER (Misnevs and al., 2017).

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The research is part of the project "Implementation of Software Engineering Competence Remote Evaluation for Master Program Graduates (iSECRET)" run by TTI, contract No. 2015-1-LV01-KA203-013439, co-financed by EC ERASMUS+ program.

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COMMUNICATION WITH THE STUDENTS OUTSIDE THE CLASSROOM & INTERNATIONAL TEACHING & LEARNING

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Keywords: Interaction, Academic Performance, Learning Communities, Distance Learning, Learning Outcomes, Assessment, Competence

Professors encourage and expect students to learn outside the classroom and demonstrate their competence; in fact, 80% of the learning occurs outside the classroom (Brown, 1958). Now it is of paramount importance to address the following questions: How should professors teach students and interact with students outside the classroom and enhance their competence (Ostman and Wickman, 2014)? How should professors get started? What opportunities and resources are available to professors to ehance the students' competence? How should faculty encourage students to come to office hours and how should faculty increase and retain the attendance during office hours (Radin, 2016)? By how much percent will these new innovative ideas increase the class attendance and enhance the students' academic performance? How to extend our teaching boundaries outside the classroom and internationally (Shields, 2003)? What new challenges will professors experience (Von Glaserfeld, 1989)? How will this change and affect professors' future teaching style(s)? Will these techniques work on the international level outside the U.S.? What adjustments will be necessary to acclimate?

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American Mathematics Teachers of Rochester Association
New York State Department of Education.
Rochester Institute of Technology Faculty Institute on Teaching and Learning.
Rochester Institute of Technology Faculty Learning Community.

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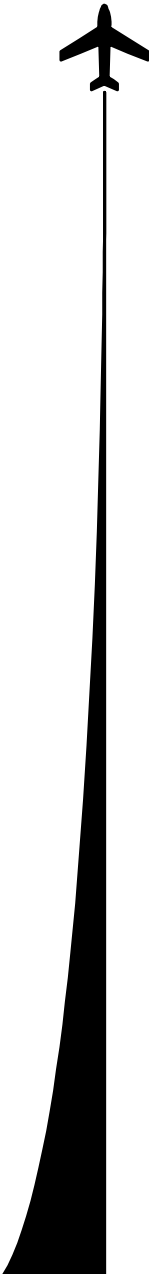

Session 1

Internet Portal as Open Education Resource (OER), iSECRET Experience

A TRUSTWORTHY ARCHITECTURE FOR ONLINE EDUCATIONAL COMPETENCE EVALUATION SYSTEM

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Keywords: security issues for online educational enviroments, cryptography, trust, educational data

Education is a complex procedure, which includes creation, collection, organization, storage and management of educational related aspects such as curricula, content, study subjects, competences, evaluation tools and many others. Advances in information society has affected the educational system in various approaches from the way of creation, presentation and exchange of educational information to the way of handling the amount of educational content in digital form, the speed at which it is produced and the methods that it is presented, exchanged, organized and stored. The advent of World Wide Web has tremendously affected all learning and educational procedures and a new era created the e-learning, which provides new educational tools and methods for managing and harnessing educational material. The arising of new educational environments and the need for presenting study subjects and evaluating competences has lead into an endless list of different types and formats that influences dramatically the ways of its management from ICT perspective. The huge expansion of Internet has increased the vulnerability of electronic educational environments (*Zuev 2012*) and e-learning portals but it is a possibly hostile environment for secure data management. In most cases, educational organizations have to deal with all the open security challenges that could cause huge data and financial losses, harm their reputation and strictly affect people's trust on them. Special care has to be taken that the algorithms, services, applications and data uploaded to the educational portal concerning the teaching material and in general the operation of an educational management system will remain secure and confidential to all users.

Here we examine and propose a trust preserving approach for handling the increasingly complex issues of designing, developing and creating data management systems suitable for educational and e-learning environments. Any proposed system for educational organization operation, access and management should follow a strict design and implementation methodology that handles the complexity of the system in separate, easily manageable "layers of trust" while it will apply in parallel risk assessment and management methodologies in order to minimize any security issue and to present them in a user perusable form.

The proposed model addresses a list of fundamental operational and security requirements. It is designed as a standalone solution but it can be flexibly adapted in broader educational tools and environments. It copes with many open security flaws and we believe that it can be the backbone of any educational organization for managing its content. It is adapted in the broader competence evaluation infrastructures of educational study subjects as well as existing management platforms of educational organizations. Many of the applied ideas can be used in various application domains: watermarks on proxies are useful for secure purchasing environments where a central system (e.g. institutional main server) has online educational services. Data annotation by professors can be adopted by educational institutions in order to eliminate labour costs. IPR control on educational content and scalability through medians should fit for online evaluations to safely distribute their content to digital subscribers. Furthermore, many cryptographic techniques can be applied in various products: bit commitments, state stamping and watermarked proxies can be motivated into educational platforms such as the Artesia data management system (Dougiamas et al 2003), in order to lower the costs of encrypting great amounts of data and adopting certain external software solutions. The idea of a distributed network of medians connected through VPN with a central system could be integrated into Dspace (Dspace 2011) to effectively provide secure scalability. Finally, we plan to further expand the implementation of our model and use it to evaluate the performance of the architectural model. In particular, we wish to examine the security levels achieved as well as the scalability of the system to large number of viewer requests.

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AN APPROACH FOR AUTOMATED SOFTWARE ENGINEERING COMPETENCE MEASUREMENT: MODEL AND TOOL

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Keywords: Software Engineering, Automated Competence Measurement, European e-Competence Framework (e-CF), Audience Response System (ARS)

Since more than two decades ago, the Competence-Based Assesment (CBA) (Wolf, 1995), was proposed as a possible evaluation method not only for instructors, lecturers and student, but also for evaluation of employers (Gulikers, Biemans, & Mulder, 2009) and, more recently, for workers (Małachowski & Korytkowski, 2016). Following the recommendations discussed by Wolf (Wolf, 2011), the CBAs are constituted by three essential components: (1) the emphasis on outcomes, specifically, multiple outcomes, separately considered; (2) the belief that the outcomes can and should be specified to the point where they are clear and transparent for the stakeholders; (3) the decoupling of assessment from particular institutions or learning programmes.

Focusing on educational institutions, in the last years, the concept of assessment has been shifted from education centred on instructors to education centred on students (Reynolds & Miller, 2012), causing a change from the curriculum based on the contents to curriculum based on competences (Wesselink, Dekker-Groen, Biemans and Mulder, 2010). The importance of evaluation based on competences is the assumption of assessing not only knowledge, but also other parameters, such as behaviour, aptitude, skills, that allow us to achieve a precise student evaluation. For this purpose, several studies, such as, (Brown, 2015) or (Gómez, 2014), propose different assessment trends and methods for assuring good practice in higher education.

On the other hand, the usage of new learning techniques in the European Higher Education Area (EHEA) and other educational institutions, is complicated without the interaction with the Information Technologies (IT). At this point, the Bolonia's process introduce an amount of recommendations to adopt new teaching methodologies, for instance, continuous assessment

(Nistal, 2012), the incorporation of Information and Communication Technologies (ICT), through the inclusion of devices, tools and applications, or the promotion of practical group activities, instead of traditional methods such as master classes.

Nowadays, the vast majority of the classrooms in European Union (EU) have the necessary infrastructure to develop new e-learning systems using different tools and applications such as the Audience Response System (ARS) (Zhu, 2007). In educational field, the ARS systems are a technology that allow students to answer the questions (or full questionnaires) proposed by the instructor in real time. Several studies, for instance (Efstathiou and Bailey, 2012) or research developed by Fernández-Aleman et al., (2014, 2016), perform different analysis of the usage of ARS systems in higher education in both nursing and pharmacy students at university level. The students expressed satisfaction with the content provided by ARS tools and the methodology used during the process of learning. To the best of our knowledge, no previous work has reported on the use of ARS systems in the software engineering discipline.

With the aim of achieving an automated software engineering competence measurement and taking into account the description of ARS systems carried out above, this paper presents an innovative approach for automated competence evaluation which allows instructors and professors to assess software engineering students. In our case, the application employed is called SIDRA[1], an ARS tool developed by the Software Engineering Research Group of the University of Murcia. This application has already been tested in several courses from different educational institutions proving it as an appropriate evaluation method for students. We propose to integrate SIDRA with SECEIP (Software Engineering Competence Evaluation Internet Portal), designed and implemented in the iSECRET (Implementation of Software Engineering Competence Remote Evaluation for Master Program Graduates) project. The SECEIP portal will be endowed with a new means of assessing students anytime and anywhere, thanks to the characteristics of wireless devices such as smartphones or tablets.

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THE CASE STUDY OF SOFTWARE ENGINEERING E-COMPETENCE OF AN EVALUATION PORTAL

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Keywords: E-competence evaluation, learning outcomes, educational portal

Over the last years the widespread use of the Internet and new technologies by huge volumes of people has led to the creation of open educational environments. But they require many resources along with the recognition and validation of learning outcomes platforms towards the realization of concepts of e-participation as integral parts of academic and industrial sector (Bule, 2007), (Bule, 2013), (Misnevs, 2010) and (Misnevs, *et all.*, 2010). We have entered a phase when old academic practices are strongly challenged and students demand direct involvement in validation of their education. One of the main obstacles for the wide adoption of competence evaluation tools is the reluctance of students to participate. This reluctance can partially be attributed to the relatively low penetration of technology of academic community and labor market. However, the main reason behind this reluctance is the lack of common standards for higher education qualifications, which is needed for establishing a common way of measuring educational outcomes in the EU member countries related to actual ICT jobs requirements.

Competence evaluations enable educational institutions to establish a common standard for higher education qualifications in order to best meet their students' needs. Such evaluations have been conducted for many years in higher education institutes based on traditional approaches such as printed out questionnaires. Compared to traditional paper-based questionnaires, the introduction of electronic competence evaluation procedures has a number of advantages that merit the consideration, specifically, a) it allows the students to evaluate their competences from their home at their ease and beyond privacy breaches, b) results are automatically archived in electronic format allowing fast further processing for the extraction of useful information, c) it offers the possibility of using a unified metadata and service IT system for promoting the educational materials, d) it makes key educational resources shareable, storable, findable and interoperable on a global scale.

In this paper we describe an Engineering Competence Evaluation Internet Portal (SECEIP) that is being developed within the project ISECRET. The Internet portal provides students and professors with a research-based online tool that supports the exchange of information on learning outcomes, referring to graduate's knowledge, skills and e-CF competence upon completion of their

Master of Science in a software engineering program. It also includes unified metadata and service IT system for promoting educational materials.

The SECEIP Portal offers to students a possibility of evaluating their competences that they have acquires for specific learning outcomes from a distance through the Internet and they are able to provide their feedback proving their eligibility to participate in the evaluation while sharing graduate learning outcome definitions and their competences. In this paper we describe the architecture and main scenarios of the SECEIP portal. This portal would be used on a small scale for verification of higher education qualifications and measuring competence technologies in the eParticipation domain in order to be able to introduce these technologies to the educational communities of all levels in Greece and other partner countries in the future. These technologies will be the vehicle for managing data of academic learning outcomes (LOs) and e-CF competences in outcome-based learning eParticipation in academic community whereby any participant will be able to prove his/her competence to a specific learning outcome.

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SOFTWARE ENGINEERING COMPETENCE REMOTE EVALUATION PROCESS MODEL

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Keywords: Software Engineering Competence Evaluation Internet Portal, The European e-Competence Framework (e-CF), competence-base education, formal education recognition

The research provides analysis of existing models for competence evaluation and suggests Software Engineering competence remote evaluation process model. We separate competences into two domains: professional and academic.The model was developed and implement for e-CF professional competence and academic competences evaluation for Software Engineering Master Program graduates (e-CF, 2016).

The remote evaluation process is based on the developed methodology, which consists of the following four general steps (Misnevs *at al*., 2017):

1. Create a template to describe the set of competences for each dedicated course as a collection of knowledge, skills and attitude/proficiency level.
2. Write rubrics for each item of the competence evaluation.
3. Create tests separately for knowledge, skills and attitude/proficiency level to measure each item of the competence.
4. Calculate the final competence evaluation mark using an integration formula with weights.

The remote evaluation process model can be divided into two business processes: (a) Competence test design, and then (b) Competence test completion. BPMN (Business Process Model and Notation) model was developed as a summary of both processes.

According to each subject Syllabus Learning Outcome specifies a collection of Competences. Every Competence is related to a Scoring Rubric. For each competence of Syllabus it is decomposed in a collection of Knowledge,

Skills and Attitudes (Proficiency) sub-competences. For each sub-competence of Syllabus it is defined an Evaluation Criterion. Every Evaluation criterion is covered by at least one Multiple Choice question in Quiz. For each competence there is a set of Quizzes to be completed. System provides feedback on the total score obtained in the competence and on the Mastery Level achieved for each Evaluation Criterion.

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ON-LINE TRAINING COURSE "HOW TO USE SECEIP" FOR ACADEMIC PERSONNEL AND MASTER PROGRAM GRADUATES

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Keywords: On-line training course, academic personnel, master program graduates, Software Engineering

In this paper the Trained Master Program academic staff and master students for usage of Internet Portal SECEIP for competences in SE&ST evaluation is presented. This Trained Master Program consists of on-line training course "How to Use SECEIP" for academic personnel and master program graduates.

The Trained Master Program will be developed within the frame of iSECRET Project. The objectives of the project are described in the paper "Remote Evaluation of Software Engineering Competences" by B. Misnevs, V. Jusas, J. L. Fernandez Aleman and N. Kafadarova (2017). The general aim of the project is to boost innovation and digital skills in European universities in order to deliver the high quality education and digital skills which 90% of jobs will require by 2020. The iSECRET project implements the unique combination of several LPP goals achievement in the following types of Strategic Partnership: INFORMATION AND COMMUNICATION TECHNOLOGIES (SE&ST, e-CF), OPEN EDUCATIONAL RESOURCES (Internet Portal) and RECOGNITION AND VALIDATION OF LEARNING OUTCOMES (Methodology for LO evaluation and competence testing). This project will specifically benefit educators and students by providing them with a research-based online tool (Open Educational Resource) that will support virtual mobility and the open exchange of information on learning outcomes in terms of eJobs competence, referring to a graduate's knowledge, skills and competence upon completion of the Master of Science in Software Engineering Program.

The project partners will create an interactive resource, which will consist of two parts – one on-line training course "How to Use SECEIP" for academic personnel and another on-line training course "How to Use SECEIP" for "Software Engineering" master program graduates. The partners will do the following activities: Development of teaching material for on-line course "How to use SECEIP", Course material uploading (into LMS Moodle) and testing, Localization of teaching material for on-line course "How to use SECEIP.

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TESTING MATERIAL FOR SOFTWARE ENGINEERING MASTER PROGRAM GRADUATES EDUCATIONAL AND LEARNING OUTCOME EVALUATION

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Keywords: Software Engineering Competence Evaluation Internet Portal, competence – based education, knowledge testing, closed test

To assess student's knowledge there are many methods. Some evaluation methods require quite active participation of the examiner; the other methods require less active participation of the examiner. If the examiner takes active participation in the student's knowledge evaluation, the assessment can be subjective. The emotions of the examiner, which can be evoked by various circumstances, can influence the final student's knowledge assessment. Everyone is wishing to have an objective assessment. Therefore, the evaluation methods, in which the examiner is taking less active part, are preferred. One of such methods is test. The test can be either closed or opened.

For the opened test, the examiner formulates the questions that require short answers consisting from one to four statements. The examiner himself has to evaluate the answers. The assessment can be subjective.

For the closed test, the student gets several questions with possible options for the answer. The options can be either single-choice or multi-choice (Misnevs et al., 2017). For the questions with single choice option, four options are usually preferred. The questions with multi-choice options can have more than four options. The student before answering the question should know whether the question is the single-choice option or multi-choice option. The mix of different choice option questions distracts student's attention, therefore, the one kind of the questions for the test should be chosen. Moreover, if the multi-choice option questions are used, there is a possibility to define openly the number of options or to conceal the number of options. So, the complexity for the students to answer correctly is increased if the number of options is not written openly.

If we consider the test preparation from the perspective of the examiner, to restrict himself to present the questions with single choice option is quite serious limitation. Many questions, which usually have multi-choice options, exist. If we restrict ourselves to single-choice questions some questions cannot be asked at all; some questions can be formulated in a little bit artificial way. So, we must decide which option to choose, easier for the student or easier for

the examiner. We prefer the option "easier for the student", therefore, we suggest to formulate the single-option questions with four possible options.

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TASK-BASED APPROACH IN 3D EDUCATION FOR SECURITY AND SAFETY

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Keywords: tak-based approach, virtual reality, safety and security education, 3D environment

Emerging technologies bring promises to didactics of security (cf. Chitarro, 2016) and safety education (cf. Xu et al. 2014, Shi et al., 2016). In Poland this kind of education is the result of an agreement between the Ministry of National Education and the Ministry of National Defense of the Republic of Poland. Its scope covers broadly defined civil defense, methods of protection against various hazards and preparation for dealing with disasters, first aid. It also involves typically military subjects, such as weapons types and military service rules, selected issues on international law of armed conflict and topography. A crucial element of security and safety education is the possibility of making simulations (Gantt, Webb-Corbett, 2010), which provides painless learning on mistakes. In 3D environment this can be provided by the use of the task-based approach (TBA). Although this approach has been initiated and popularized in the area of second language learning and teaching (cf. Calver, Sheen, 2015), it can be adopted in education for safety and security. A numerous advantages of task-based approach have been distinguisted: students able to control topic development, use of referential questions, opportunities to negotiate meaning when communication problems arise, content-focussed feedback, repetitions (Ellis, 2003: 30). Creating tasks for learners in virtual environment brings numerous assets, e.g. students can be learnt how use safety procedures, preventive measures, what to do in crisis situations or how to perform while online safety risks (Palfrey et al. 2010). Research on the use of TBA for the needs of security and safety education conducted in virtual reality indicated that such an approach significantly increases learners' competences in the scope of security and safety education.

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METHODOLOGY FOR REMOTE EVALUATION OF COMPETENCES IN SOFTWARE ENGINEERING (SOFTWARE TECHNOLOGY)

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Keywords: Methodology, remote evaluation, competences, Software Engineering

In this paper we present the developed methodology for remote evaluation of competences in Software Engineering (Software Technology). This Methodology is developed on the base of existing European standards (European Qualifications Framework, European eCompetence Framework etc.) adapted for on-line Educational Outcome evaluation. Methodology recommends a set of Outcome models for different levels of Educational Outcome (knowledge, skills and competence) measurement and evaluation in SE&ST professional area. The Methodology defines main requirements for evaluation planning, resource alignment, testing implementation, results reporting and evaluation results mapping.

The Methodology has the following four general steps:

1. Create simple Template for partners to describe the set of Competences for each dedicated course as a collection of Knowledge, Skills and Attitude/Proficiency Level.
2. Write Rubrics for each item of the Competence evaluation (criteria and grade scale).
3. Create tests (or any assignments we need) to measure each item of the Competence (separately for Knowledge, Skills and Attitude/Proficiency Level).
4. Calculate the final Competence Evaluation Mark having a kind of integration formula (using formula with weights).

The Methodology is developed within the frame of iSECRET Project. The main aim of the project is described in the paper "Remote Evaluation of Software Engineering Competences" by B. Misnevs, V. Jusas, J. L. Fernandez Aleman and N. Kafadarova.

Main Definitions used in iSECRET Project are: Educational Outcome, Learning Outcome, Knowledge, Skills, Attitude, Proficiency Level.

GENERAL Template for Analytic Rubric used in iSECRET Project was developed on the base of the C.A.Mertler (2001) publication.

The general Overview of the Rubrics structure and usage:

1. For each Competence (academic or e-CF) a separated Competence Scoring Rubric is created. Each competence Rubric must be marked by the competence identifier (e.g. A1, Mj10-2 or Sp10-1).

2. In each Competence Rubric there are 3 parts: Knowledge. Skills and Attitude/Proficiency containing several items.
3. Each competence element may be scored by from 1 to 4 (Beginning-1, Developing-2, Accomplishing – 3, Exemplary – 4).
4. Total competence score calculation is performed using weights from 0 to 1 (e.g. for academic competence part Knowledge – 0.5. part Skills – 0.3 and part Attitudes/Proficiency – 0.2 or for e-CF part Knowledge – 0.3. part Skills – 0.4 and part Attitudes/Proficiency – 0.3).

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WHY DON'T WOMEN CHOOSE STEM? GENDER EQUALITY IN STEM CAREERS

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Keywords: gender equality, research, STEM education, career, analysis

Gender equality and gender mainstreaming in research is one of the key priorities in research in Horizon 2020 (Horizon 2020, 2017). The same included in a set of the 17 Sustainable Development Goals (SDGs): "Providing women and girls with equal access to education, health care, decent work, and representation in political and economic decision-making processes will fuel sustainable economies and benefit societies and humanity at large" (Sustainabledevelopment.un.org., 2017).

European Commission considers that without gender equality in science and without a better use of the human resources available scientific excellence will never be truly achieved within the European Research Area. In research special conditions and programmes in Horizon2020 in following three main pillars were studied and analysed in order to address the gaps in the participation of women in the Framework Programme's projects (Horizon 2020, 2017):

- legal and other barriers to the recruitment, retention and career progression of female researchers while fully complying with EU law on Gender equality
- gender imbalances in decision making processes
- the gender dimension in research programmes.

In 2010, on average throughout the EU-27, 15.5% of institutions in the Higher Education (HE) Sector were headed by women, and 10% of universities had a female rector. On average, 36% of board members were women in 2010 (EIGE, 2017). What does this mean, what changed for the last years and what about situation in Latvia with female presence in decision making processes?

The main point of study in this paper is: what we have in STEM research sphere.

The proportion of women among researchers in STEM direction has not changed between 2001 and 2015 despite major increases in % of women among students and total number of researchers. Women are strongly under-represented in the field of science and engineering, the proportion of women among:

- PhD students is ~ 38%;
- full professors is ~10% (EIGE, 2017).

In Latvia according to EuroStat in 2015 specialists in information and communication sphere were represented by 14,6 thousand men and 4,8 thousand women.

In this paper the statistics of women' presence in STEM research and education, and decision-making in EU and Latvia was analysed.

HE needs to promote STEM careers to encourage women to see the benefits to them, because women tend to underestimate their potential for successful carrier in STEM. STEM careers awareness is often limited by stereotyped images and girls usually have little idea of what STEM occupations offer, lack of visibility of breadth of STEM options and that's why they reject STEM carrier. HE needs to make STEM careers advice to be more female friendly and encourage the girls to study science and female students to further embrace a career in research.

The study represents a contribution to the work which examines gender equality in STEM sphere and gives the recommendation on how to change situation in gender quality among researchers in STEM direction.

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PRESERVING ANONYMITY IN STUDENT EVALUATIONS

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Keywords: course evaluation, student evaluation, anonymity, uuid, e-voting

Higher Education Institutes in Greece have introduced a process of online course evaluation. Students are expected to participate in the process by connecting to an information system supported by the Unit of Quality Assurance (UQA/MODIP) and provide feedback regarding the quality of the courses they attend. Students are urged to participate because their opinion is very important for the assessment and improvement of the educational experience. It has been observed that student participation in this process is considered low. One of the main reasons attributed to this is that students do not trust the anonymity of their submissions (Hellenic Quality Assurance and Accreditation Agency, 2016).

We have tried to substantiate the lack of interest of students to participate in the process by conducting a simple survey, where students are not asked to evaluate a course but rather to provide some feedback on the reasons they might opt not to. We have used the Questioner Activity supported by the Open Eclass E-learning platform (www.openeclass.org), which is widely used by Higher Educational Institutes in Greece.

We have determined that indeed one of the main reasons students are hesitant to provide an evaluation is that it might affect their relationship with the instructor. A considerable percentage of students (30%) in the survey believes that the course evaluation might not be completely anonymous. The real percentage might be even higher because in the particular survey the majority of participating students claimed that they had filled out the evaluation of the course.

In the case of TEI of Epirus the students in order to access the information system for submitting their evaluation are required to login with their Single Sign On (SSO) credentials that they use for enrolling in classes, checking their grades, accessing e-learning material etc. We believe that this is the main reason they feel that their evaluation submission could be associated to their login credentials and thus affect its anonymity. Even though professors could assure them that they personally do not have access to the raw evaluation forms it is difficult to argue against the case that associations are still preserved in an underline database that could be available to someone with the appropriate privileges.

In this work, we are reviewing several proposals that originate in research about preserving anonymity in another domain where anonymity is important,

namely e-voting (Meletiou et al, 2011), (Schneider A., Meter C., and Hagemeister P., 2017), (Riera A. and Borrell J., 1999). We have also examined advantages or disadvantages of manual processes where students are provided paper forms that could be manually filled and returned as a group of forms, disassociating in this way the a particular form from a student. We propose a solution based on a ticket number system, inspired from the concept of random number generation such the one utilized in the specification of Universally Unique Identifier (UUID) (Leach P. et al, 2005). This could lead to a system that is relative simple to implement and use. Students could easily trust the preservation of their anonymity in course evaluations. The proposed solutions maintains the main advantages that an electronic online evaluation could have compared to paper evaluations such as the low cost for preparation and processing, the convenience of them being filled out in time and place and the enforcement of rules that guarantee the precision and trustworthiness of the responses. Some of these rules could be that only students enrolled in a class should evaluate it; multiple submission by a single student for a course should be prevented etc.

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RUBRICS TEMPLATES FOR PERSONAL COMPETENCES' SELF-ASSESSMENT OF MASTER OF SCIENCE IN SOFTWARE ENGINEERING PROGRAMME GRADUATES

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Keywords: e-Competence Framework (e-CF), rubrics, software engineering education

The *Implementation of Software Engineering Competence Remote Evaluation for Master Program Graduates* (iSECRET) project is an ERASMUS+ programme run by six partner universities in Europe (European Commission, 2017). It offered a framework for researching the problem of academic and professional software engineering/software technology knowledge representation for master programme graduate's competence testing purposes.

In the context of the iSECRET project, the subjects of a one year (60 ECTS) joint master programme in modern software engineering (software technology) were designed. This includes the syllabi of these subjects and, in particular, the detailed description of rubrics for the self-assessment of personal, academic and professional (i.e. based on the European e-Competence Framework, e-CF) competences of Master of Science in software engineering programme graduates. The rubrics were created as follows: (i) firstly, the structure of a rubrics template for personal competences' self-assessment was proposed based on previous research (Mertler, 2001), and accepted by the iSECRET project partners; (ii) secondly, starting from this template structure, the project partners developed rubric templates for their subjects; and (iii) finally, after that, those templates were populated with descriptions of expected learning outcomes, specifically adapted to knowledge, skills and attitudes/proficiency levels.

A rubric is an easily applicable form of authentic assessment. Developed rubric templates give clear guidelines on how to evaluate or grade knowledge,

skills and attitudes/proficiency levels. Each rubric template contain the following items:

1. One or more dimensions that serve as the basis for judging the student response.
2. Definitions and examples to clarify the meaning of each dimension.
3. A scale of values on which to rate each dimension.
4. Standards of excellence for specified performance levels accompanied by models or examples of each level.

The process for developing the rubric templates used in the iSECRET project is made of the following activities:

1. For each competence (academic or professional, e-CF) a separated competence scoring rubric is created. Each competence rubric must be assigned a unique competence identifier.
2. In each competence rubric there are three parts: knowledge, skills and attitude/proficiency level, containing several items.
3. Each competence element may be scored from 1 to 4 (i.e. beginning - 1, developing - 2, accomplishing - 3, exemplary - 4).
4. Total competence score calculation is performed using weights from 0 to 1 (e.g. for academic competence: part knowledge - 0.5, part skills - 0.3 and part attitude/proficiency level - 0.2; or for professional, e-CF competence: part knowledge - 0.3, part skills - 0.4 and part attitude/proficiency level - 0.3).

For instance, if one e-CF competence scoring rubric of a subject indicates that the knowledge part has a weight of 0.3, the skills part a weight of 0.4 and the attitude/proficiency level part a weight of 0.3, and the score evaluation is 4, 2 and 2 respectively, then the total competence evaluation is between Developing (2) and Accomplished (3):

$$4 \times 0.3 + 2 \times 0.4 + 2 \times 0.3 = 2.6$$

As a validation activity, partner universities prepared the rubrics of two major subjects and two specialisation subjects. For each of these subjects, partner universities developed the rubrics of, at least, one academic and one professional competence. As a result, the project partners created a total of 44 rubrics. Moreover, the developed rubrics were implemented in the Software Engineering Competence Evaluation Internet Portal (SECEIP). This system, which has been developed in the context of the iSECRET project, helps self-evaluate master programmes' graduates and master students by performing on-line testing assignments.

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TEST ENGINEER COMPETENCES: CONTEMPORARY INDUSTRIAL REQUIREMENTS

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Keywords: software testing; test engineer; ECF; competences; skills

Software testing services have experienced enormous change with the shift of business to models introduced by digital era. Digital business models are expecting high quality systems thus raising the expectations and requirements for test engineers' knowledge and skills. These rapid changes are looking for new approaches in the contemporary education process. In reply to these challenges EU came up with a European e-Competence Framework (ECF) for ICT professionals in all industry sectors.

Around 40 competencies are suggested to provide a common language, standardize and define knowledge requirements for ICT professionals, including test engineers. These competences are grouped around knowledge and skills expectations. The current version of ECF defines software testing competences for four proficiency levels and does not cover proficiency levels corresponding to test engineers and managers who have more than 10 years of experience in the field. The motivation behind this paper is to review critically the existing software testing competencies introduced in European e-Competence Framework and proceeding from the existent classification suggest the additional competencies to cover additional levels of software testing which are profession based on the extensive author's experience in software testing field.

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IMPROVING THE QUALITY OF DISTANCE LEARNING APPLICATIONS BY USING THE STREAM CONTROL TRANSMISSION PROTOCOL

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Keywords: Distance learning, stream control transmission protocol, quality of service, modern protocols, multimedia distribution, real time communication

Contemporary distance learning applications are basically multimedia online applications that demand considerable network and processing resources. (Aderson, 2011a). The distribution and support of relevant multimedia rely on the telecommunication and network infrastructure and various protocols they utilize (Balakrishnan, 1999b, 1998a). Therefore, the potential deployment of advanced and improved Internet technologies and protocols should be of considerable interest and importance to distance learning application designers.

Currently, traditional protocols provide such applications with limited capability due to their inherent weaknesses. For example, applications that are based on the TCP protocol can limit their performance or affect their synchronization due to head-of-line (HOL) blocking, a phenomenon that occurs when a line of packets is held up by the first packet. This weakness occurs in input-buffered network switches, when out-of-order packet delivery or multiple HTTP pipelining requests occur (Balakrishnan, Jacobson, Braden, 1998a, 1998b, 1992). Other weaknesses of distance learning applications that can be caused by existing protocol limitations have been presented and analysed in depth in other works (Chiu, Allman 1999a). For example, the aggressive behaviour during congestion, the absence of integrated loss detection and recovery, the increased load on the web server and the increased connection establishment latency are few of them. All these weaknesses can significantly affect the performance of distance learning applications.

This work explores the possibility of relying on the Stream Control Transmission Protocol (SCTP) in the designing of distance learning application to alleviate weaknesses such the aforementioned ones (Kaur, Budzisz, 2015a, 2012b). The SCTP is a recently standardized transport layer protocol with various features that allow it to offer improved support for the communication requirements of parallel applications.

In this work, we investigate the benefits of using SCTP instead of other protocols such as TCP, and its advantages or disadvantages in a multimedia educational services setting. We anticipate that some basic features of SCTP,

which are useful for e-learning applications, are the ability to support multi-streams and multi-homing services (Stegel, 2010b). The SCTP data streams are able to exchange different types of information, and each stream can be customized for the quantitative and qualitative requirements of the data it transmits or receives. In addition, SCTP provides the advantages of preserving message boundaries and supporting unordered reliable message delivery. Furthermore, the SCTP protocol is able to schedule multiple streams, transfer multiple files simultaneously, support both client-server and peer-to-peer applications and prevent congestion creation. All these features can be of crucial importance in multimedia e-learning applications.

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SYLLABUS TEMPLATE PROPOSAL FOR A JOINT MASTER PROGRAMME IN SOFTWARE ENGINEERING AND TECHNOLOGY

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Keywords: e-Competence Framework (e-CF), syllabus design, software engineering education

The *Implementation of Software Engineering Competence Remote Evaluation for Master Program Graduates* (iSECRET) project is an ERASMUS+ programme run by six partner universities in Europe (European Commission, 2017). It offered a framework for researching the problem of academic and professional software engineering/software technology knowledge representation for master programme graduate's competence testing purposes.

In the initial step of the iSECRET project, relevant master programmes in software engineering/software technology from European universities were analysed. Starting from this information, we gathered valuable information to set the general guidelines of our own proposal. After that, we needed to create a syllabus template that would be used later on in the project for subsequent assessment of academic and professional competences.

The process for creating the syllabus template had three steps. Firstly, the general structure of the template was developed starting from a set of publicly available examples from different universities. Secondly, the list of subjects of a joint master programme in modern software engineering/software technology was agreed by the iSECRET project partners—taking into account a previous overview of master programmes that were offered by top-level European universities and current recommendations in literature (GSwE2009, 2009)—, and used for syllabus development. Finally, the actual subject descriptions (i.e. the subjects' syllabi) were written to exemplify and validate the template and for their use in subsequent stages of the iSECRET project.

The proposed syllabus template has twelve sections:

1. Subject details: details on the subject and the teaching staff.
2. Subject description: catalogue description of the subject.
3. Course access requirements: Incompatibilities with other subjects and recommended background for students willing to enrol in the subject.
4. Learning outcomes: list of statements of what students will learn in the subject.
5. Subject-specific competences and their relation to degree-specific competences: list of competences written in terms of the European e-Competence Framework (e-CF).
6. Subject contents: blocks and thematic units in which the set of knowledge, skills and attitudes that will be addressed in the subject are structured.
7. Learning activities: set of activities that will be carried out in the context of the subject, including the time devoted to them.
8. Teaching methods: teaching methodologies associated to the learning activities.
9. Assessment: instruments, criteria and weight for the assessment of competences.
10. Course timetable: course timetable as well as planned exam calls.
11. Reading list (required and recommended readings): list required course textbooks and list of other readings available.
12. Additional information: any additional information that cannot be inserted in the previous sections.

Our syllabus template has been successfully applied in the iSECRET project for subjects' syllabi trial. Each partner university wrote the syllabi of two major subjects and two specialisation subjects. This means that the partner universities have developed a total amount of 24 subjects' syllabi using this template. These subjects have been designed in the context of a one year (60 ECTS) joint master programme in modern software engineering (software technology). Furthermore, the template could be used outside the project if a master programme is to be implemented in the future.

Acknowledgements

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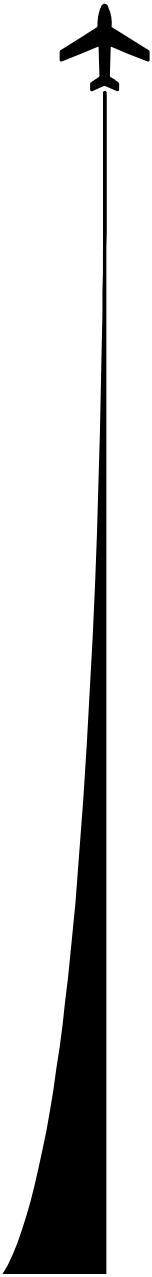

Session 2

Information Technologies, Learning Experience

AN EXPERIENCE OF FLIPPED CLASSES IN THE PROBABILITY AND STATISTICS COURSE

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Keywords: Flipped class, active learning, probability and statistics

Flipped classes have recently gained significant attention in academia as a successful strategy of active learning implementation (Bergmann and Sams, 2012). The flipped class approach inverts a traditional education process by delivering educational content outside the classroom (via video lectures, readings and online discussions) and spending contact hours on active learning: problem solving, practice and lab activities. A wide range of problems creates premises for "flipping" the STEM (science, technology, engineering, and mathematics) university course:

- drastically different mathematical and programming background of students;
- students, who are not engaged in math and take the surface approach of learning;
- a difficult balance between teaching theoretical concepts and developing practical problem-solving skills during contact hours.

The mentioned problems directly lead to higher student dropout rates. At the same time modern technologies provide higher possibilities for independent learning, including multiple MOOCs (massive open online courses); excellent learning materials (including video lectures) from world-class professors; open professional communities, specialised discussion forums etc. Active usage of such resources allows for increasing the efficiency of the learning process (Prince, 2004), moving passive learning out of classes and utilising contact hours for higher level education objectives (in Bloom's taxonomy).

This paper is based on the author's experience of application of flipped classes in the introductory probability and statistics course for software engineers at the Transport and Telecommunication Institute. Although positive effects of flipped classes have widely been acknowledged in theory, evidence of their successful practical application for teaching the introductory probability and statistics courses is very limited (Oeyen, 2015; Vidic and Clark, 2015). A complete flipping of this course requires significant preparatory efforts and is generally risky, because the course is designed to creat strong theoretical background for further probability-based software engineering courses (system modelling, methods of statistical data analysis, introduction to artificial intelligence). So, as the first step, the author decided to flip just computer-

based practices, designed for modelling probability concepts and basic statistical data analysis. These practices are implemented in the R environment (CRAN, 2017), and students must complete the introductory course on programming first, but preliminary knowledge of R is not required. Students were provided with a wide range of materials for independent learning of R environment and its applications in probability and statistics, including books, short video lectures, and R source code examples for solving standard problems. Contact hours were utilised for explanation of problems to solve ("homework" in the traditional education process) and work retracing and mentoring.

The flipped computer practices were introduced recently, but several issues have already been identified:

- Increased preparation time is required at initial stages. Quality of learning materials, available over the internet (e.g. Youtube video), is very heterogeneous and sometimes searching for correct and powerful explanation is more time consuming than recording of the own video.
- Motivated students make excellent progress both in probability and statistics and in R programming, which is hardly reachable if the traditional approach is applied.
- Some students are passive in learning and their results seem lower than expected.

At this moment the number of students, who have completed the flipped classes, is not enough for statistically significant conclusions. However, the author and several interviewed students are positive about the observed results, so, further course enhancements and result analysis are planned.

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DEFINITION OF E-CF COMPETENCES FOR SOFTWARE ENGINEERING SUBJECT

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Keywords: Competence, competency-based learning, software engineering

The problem of rising the quality and efficiency of a learning process is highly topical because the demand for highly qualified specialists is steadily growing, but the quality of training is not always satisfactory for employers. In addition, when applying for a job, the competitor's competence in solving the necessary questions and tasks is usually assessed. Therefore, at present, in many educational institutions, the competence approach is used or actively introduced into the training of specialists. The works of scientists and teachers are devoted to various questions of applying this approach to higher education, such as types and forms of competency-based learning (Vasyutina, 2010; Misnevs, 2017; Competency-Based Learning, 2014), structuring and detailing the competencies of specialists (Vasyutina, 2010; Sheval, 2011; Misnevs, 2017), assessment of students' achievements, level of competence formation and learning outcomes (Efremova, 2014; Misnevs, 2017).

The European e-Competence Framework (e-CF) provides a reference of 40 key competences which form the basis for the employability of university graduates in the area of Software Engineering (e-CF, 2016). In 2016, the e-CF became a European standard.

The aim of the paper is to define and to describe the e-Competences formed learning Software Engineering subject.

In Oxford Dictionary competence is defined as the ability to do something successfully or efficiently. More correctly, competence is a complex characteristic of a graduate's readiness to apply the acquired knowledge, skills and personal qualities in standard and changing situations of a professional activity (Sheval, 2011). So, competence consists of tree components: knowledge, skills and personal qualities (Misnevs, 2017).

To determine the e-CF competences for a subject, it is necessary to perform a sequence of steps.

- Make a list of all topics and sections of the course; the list can be divided into theoretical and practical parts;
- Based on the analysis of the list of topics, determine the knowledge and skills that will be formed in a student as a result of attending the course, i.e. the types of competencies that have been received;

- Compare certain competencies with those presented in e-CF;
- Identify methods for assessing the level of competence and learning outcomes (practical and laboratory work, reports, presentations, tests, exams, etc.).

At Riga Technical University the software engineering (SE) subject consists of two parts. The first one of 2 credit points (CP) is included into a Bachelor's, the second (4CP) – into Master's program. The Bachelor's program provides seven main topics and allows for forming of six competencies according to e-CF, namely Architecture Design, Application Design, Application Development, Component Integration, Testing and Documentation Production. Four practical works, six tests and an examination are used to evaluate the learning outcomes. The Master's program includes 13 main topics and additionally forms six competencies related to project planning and management. Three practical works, three tests, reports, presentations and an examination are used to evaluate the learning outcomes.

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LINKING EMPLOYEE GOALS TO COMPETENCES – ANALYSIS OF BEST PRACTICE IN LATVIA

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Keywords: Goal setting, goal cascading, competence management, management by objectives

Goal cascading and setting of individual goals for the employees of an organization is a common practice for big and medium enterprises. Reaching those goals is closely linked to the organization culture, processes proceed, technologies and tools including available ICT tools are used but it is also dependant on individual abilities, skills and attitudes, e.g. competences of employees. It can be argued that without taking into account the competences acquired by an employee when setting individual goals for the employee the risk of not reaching the goals will increase. Therefore, identification of competences required for attaining goals, the assessment of competence levels of employees prior to assigning individual goals to them and linking these processes together is a substantial and strategic necessity for organizations. However, organizations tend to have their real or perceived differences in the goal setting process, which may make the process of generalized systematic competence assessment and the development of ICT tools for competence management difficult. Research of common practice of goal setting approaches is needed for formalization of goal setting process that includes goal cascading to employee competences with the intention to formalize the process and making it applicable to the creation of ICT support tools.

This article analyses the best practice in public service organizations and private enterprises in Latvia in setting of individual goals for the employees and linking them to their acquired and required competences. The article uses the results of research conducted by BDA during 2017 and is setting up the field for the definition of generalized goal management model.

USE OF AUGMENTED REALITY IN EDUCATION

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Keywords: ICT, augmented reality (AR), modern education

The development of ICT technologies provides a wide range of abilities to improve education process. In addition to widely known and used approaches to on-line courses, interactive whiteboards, use of computers, interactive simulators, there are many technologies which are still not used in education in an intensive way. One type of such technology is an augmented reality (AR). The AR technology is based on mixing real world data with additional static or dynamic objects. The concept of AR was presented in 1901 by L. Frank Baum in his novel titled as “character marker”. In 1957 cinematographer called Morton Heilig presented the Sensorama which delivered visuals, sounds, vibration and smell to the viewer. It was not a real AR, but the first attempt to add additional information into real-world. Then in 1968, Ivan Sutherland the American computer scientist invented the head-mounted display as a kind of window into a virtual world. The first properly functioning AR system was probably the one developed at USAF Armstrong’s Research Lab by Louis Rosenberg in 1992 (The Interaction Design Foundation, 2017).

Not looking to the fact that AR as technology has technology redness level (TRL) equal to 9, there is still relatively low usage of this technology in the education process. The educational market for virtual reality(VR)/AR is predicted to reach 300 million by 2020, at the same time the revenue from augmented reality is predicted to hit 100$ billion by 2020 (Barnes, 2017). Those numbers prove the high potential of the AR in the education area.

There are a number of tools of AR which could be found on the internet, like Argon, ARToolKit, Augment, Catchoom CraftAR, Hoppala Augmentation, HyperIndustry, TARTT, ZapWorks, arcircuits, Homework Mini-Lessons, Quiver, SciMorph, Arloon Plants, etc. Some tools are open source and could be used without limitation in the education process. It means that there is no problem regarding the availability of the software tools for AR development, management and use. Most pupils at schools and most students at universities use smartphones. This means that the hardware aspect of this technology is not a vivid factor, which influences the use of technology. One significant factor influencing the use of AR is the lack of knowledge and skills by teaching staff.

The key benefits if using AR are the following one: create an eye-catching presentation to capture the attention of the audience; create interactive lessons to involve students; ability to use portable and less expensive learning materials; higher retention; foster intellectual curiosity.

The use of AR in the education process at Latvian universities and schools are very limited and not systematic. That is why the goal of this paper is to demonstrate some examples of AR application in education area and by this intensify usage of this technology by teaching staff.

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DEFINITION OF E-CF COMPETENCES FOR THE COURSE OF "PROGRAMMING"

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Keywords: Competence-oriented approach, programming, The European e-Competence Framework

The aim of the given paper is to apply a competence-oriented approach in order to analyse the content of the course "Programming." This course has been designed for the first year students of the Bachelor's program "Software of Computer and Information Technologies" at the Transport and Telecommunication Institute (Riga, Latvia). The main aim of this course is

- to develop algorithmic thinking,
- to acquire knowledge of the basic notions and terms in programming,
- to acquaint first-year students with high level programming constructs and software development processes.

The course is designed for eight credit points (ECTS – 12), two of which are allocated for the course paper. The given work presents a detailed description of the course which is in full correspondence with those competences which are presented in the European e-Competence Framework (e-CF). The European e-Competence Framework provides a reference for 40 competences which are applied at the Information and Communication Technology workplace, using common language for competences, skills, knowledge and proficiency levels that can be understood across Europe (The European e-Competence Framework, 2014; CEN, 2014a; CEN, 2014b). The detailed description of knowledge, skills and proficiency levels that students will achieve while attending the course "Programming," when performing laboratory and practical assignments, is provided. The author also gives a full description of the ways how to verify their achievements (tasks, tests, etc.). Separately, the paper reviews the knowledge, skills and proficiency levels that have been achieved while performing different tasks that are listed.

Acknowledgements

I would like to thank Boriss Misnevs for the opportunity to get acquainted with the European e-Competence Framework and the iSECRET project, which allowed the author to form a new perspective at the courses which have been introduced in the Transport and Telecommunication Institute, specifically, the Department of Software Engineering.

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PROGRAM OF SPECIALISTS' TRAINING IN THE FIELD OF ROBOTICS

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Keywords: robots, training, study programme, industrial robot

Robots swiftly entered our life in the last decade and this trend is increasing. Robots are widely used in such areas of human activity as manufacturing, transport, healthcare, security and defence, aerospace, emergency services, agriculture and even the entertainment industries. This is most evident in manufacturing. For example, 1147 robots account for 10 thousand employees in the automotive industry of Germany and in all other industries about 170 robots (Germany Trade and Invest, 2017). According to the International Federation of Robotics, approximately 290,000 industrial robots are installed worldwide, and the annual growth of such sales is more than 10% (International Federation of Robotics, 2017). The set of practical tasks and operations that are performed by autonomous and mobile robots is expanding. Artificial Intelligence techniques are used to perform complex tasks and in difficult environments for robots (Lukas Konig, 2012). Accordingly, there is a growing demand for qualified professionals who are able to design, create, implement and maintain robotic devices and systems (Germany Trade and Invest, 2017).

The Robotics is a branch of science integrating many cutting-edge technologies of mechanics, electronics, computer science and automatic control. Currently, the study programs Mechatronics and Robotics are used mainly to train specialists who can apply and maintain automatic control systems for industrial production, and the competences related to robotics are determined by the profile of the study programme (University of Leeds, 2017; Vilniaus Gedimino Technikos universitetas, 2017).

Professional study programme "Electronics" in TTI contains several study courses developing competence in the field of robotics (Transport and telecommunication institute, 2017), but they are insufficient to solve the problems of practical robotics.

This article is devoted to the development of the study programme "Robotics" under the following conditions:

- the study programme should be aimed at creating competencies for students in the field of industrial robotics and autonomous robotics;
- the study programme should ensure the development of practical skills in the use of industrial robots in robotic production and the creation of autonomous robots;

- the study programme should take into account the trends of robotics: increasing the autonomy and intelligence of robots;
- the study programme should take into account the requirements of employers to a specialist in the field of robotics.

The main attributes of the developed professional Bachelor study programme "Robotics"are:

- the aim of the study program is to provide professional Bachelor education in the field of electronics and automated systems in subfields of industrial robotics and autonomous robots;
- distribution of credit points through study courses: general education subjects – 23%, electronics and electrical engineering study courses – 20%, programming and control theory courses – 21%, field-specific study course – 22%, mechanical courses – 14%;
- availability of training and production practices that allow one to gain practical experience in the use of modern industrial robots and the development of autonomous robots;
- two design assignments in the process of training.

The program will support in general the following professional activity of the graduate:

- an engineer in the field of industrial automation, able to program and maintain industrial robots and robotized complexes in the working order;
- an engineer-developer of autonomous robots for various applications: transport, manufacturing, agriculture etc.

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CYBERSECURITY AND IOT AS TRENDS OF MODERN EDUCATION

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Keywords: IoT, Cybersecuruty, education, learning process, Cisco Networking Academy

IoT is the outcome of the development of the Internet wherein objects and systems are embedded with sensors and computing power, with the intention of being able to communicate with each other. (EY, 2015) The IoT is integrating to daily life more and more, so security risks related to IoT attacks have increased rapidly. Thus, the growing complexity of connected environments is a challenge when insuring IT systems security at all levels.

Obviously, IoT technologies and cybersecurity can be considered as a tandem (and as the separate subjects too) and these subjects are parts of the learning process. The interdisciplinary nature of the subjects should be emphasized since they can be implemented in many study programmes such as IT, electronics, data analytics, transportation (Enisa, 2015), business management, etc. Important modern skills require the combination of business analytics skills and industry-specific skills and understanding of IoT issues. (European Commission, 2014) This concept reflects the increasing integration of innovative IT technologies into educational processes.

The current study intends to research and develop the model for the convergence of Cybersecurity and IoT concepts at the Transport and Telecommunication Institute, and to identify strategies that promote students' learning and success. In particular, we are concerned about using of Cisco Networking Academy courses.

The goal of the empirical study was to find out about students experiences of "CCNA Security" and "Introduction to IoT" courses. A survey was conducted among the target audience: students and graduates from different study programmes. More interesting and new results were presented as survey results of the undergraduates related to the course based on Cisco Networking Academy "Cybersecurity Essentials" materials.

The anticipated points for discussion include: interdisciplinary approach, learning delivery strategies, curriculum content and collaboration to engage industry.

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RECOMMENDATIONS FOR THE ORGANIZATION OF COLLECTIVE PRACTICAL WORKS

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Keywords: information society, values, teaching skills, methods

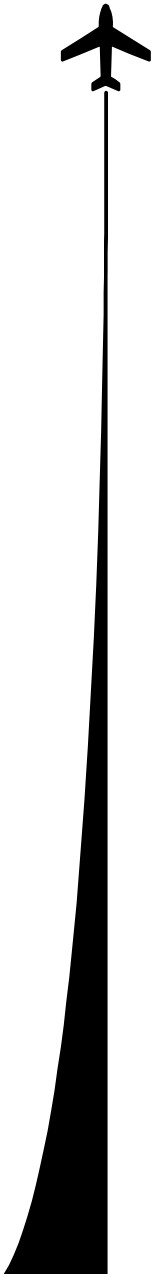
This paper is based on my previous report («Changes in the value orientations of the information society as a factor of influence on teaching techniques», on MIP-2015), and concentrates on the priorities of teaching methods in the new social conditions.

In the educational process, it is desirable to carry out practical training in the form of group projects.

It is optimal to divide the training group into teams of three students, if the number of participants is not a multiple of three, you can create one or two teams of four. Within each team the following roles will be distributed: collector, analyst, coordinator and speaker. Students distribute roles among themselves by their own volition.

Thus, students improve the skill of group work on the project, accustom themselves to fruitful cooperation.

This model of conducting collective lessons, I believe, can be successfully used in relation to other training courses and themes, where the process of collecting working material can be executed by, at least, two participants.



Session 3

Modern Business Education: Major Trends, Problems and Their Solution Methods

BENEFITS OF PARTICIPATION OF UNDERGRADUATES STUDYING MANAGEMENT AND ENTREPRENEURSHIP IN SCIENTIFIC PROJECTS

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Keywords: scientific projects, master thesis, management and entrepreneurship, personal and professional development

Master thesis is an important milestone in obtaining Master degree. The quality of the Master thesis to a large extent indicates the quality of knowledge, the level of skills and abilities of undergraduates. Undergraduates' participation in the scientific projects, parts of which become key research presented in the Master thesis, can substantially improve knowledge and research skills and abilities of the students, increase the quality of research and Master thesis per se, provide tangible benefits to the university and to the supervisor.

Modern education often assumes undergraduates' participation in the scientific projects, which benefits the students as it stimulates their personal and professional development (Alberts, 2009; Hunter *et al.* 2007). Participation in the research outside of the defined undergraduate study program enriches the student and "opens up" the door to the scientific world (Patterson, 2007). Besides, it strengthens students' research skills, ability to think logically, to analyse and formulate hypotheses, while also the probability of higher evaluation of the Master thesis is likely (Ishiyama, 2002; Gilmore *et al.* 2015).

The article is dedicated to the analysis of the benefits obtained as a result of undergraduates' participation in the scientific projects as well as to the analysis of the problems faced by the supervisor and the student. We consider the results of this cooperation based on our experience of consulting and supervising 5 undergraduates, who were also participating in the research projects in 2016 and 2017. It should be noted that often the headwind is faced by the undergraduates due to the lack of time, which can be dedicated to the quality research as undergraduates usually work when studying.

The first phase of involving undergraduates into the applied research process is associated with the issues of topic selection and student selection. Research topic in economics and entrepreneurship often is initiated by the supervisor, who is being close to the decision-makers and the authorities such as Ministry of Economics, Venture Capital Association etc., and who is able to

define topic's high relevance to the current economy's needs. Crucial moment is selection of the candidate, who possesses high level of knowledge and abilities, who is willing to dedicate significant amount of time to the research per se, who is interested in the proposed topic and self-development.

We believe that the tasks undergraduates are able to perform in the most efficient way are data gathering, data processing and analysis, literature review based on the theoretical and empirical scientific articles. Naturally, these tasks are being performed under the supurvision and the students receive constant feedback, which is vital in this process as it helps student to learn, get experience, enrich knowledge in the particular field, improve analytical skills and abilities when analyzing the data and scientific articles.

The benefit of the supervisors and the university appears to be obvious as well: the quality and the quantity of the research conducted is increased, the level of knowledge of the undergraduates and lately also doctoral students is substantially improved, academic and professional reputation of the university and supervisor is taken to the higher level.

Though there are a number of obstacles for the research project acceleration such as insufficient level of knowledge, abilities and skills of the undergraduates or the necessity to reconcile the research topic with the study program, the benefits received by all parties involved outweigh the possible problems. As the result of our supervision and involving students in the applied research, the average Master theses' evaluation was significantly above average, while two of 5 students entered PhD program.

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IS STUDENT A PRODUCT OR A CUSTOMER OF THE UNIVERSITY?

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Keywords: product-oriented strategy, client-oriented strategy, university, higher education quality, long and short run, choice

The research under consideration is devoted to the issue of implementation of product- or client-oriented strategies in the commercial university (Bailey, J., Dangerfield, B., 2000).

The topicality of this issue is increasing in the world where the higher education is becoming the must-be option for young people entering the life or adults who wish to switch to another areas in their professional career or think about professional promotion. The demand for higher education is high. Nevertheless, the supply of the service is significantly higher due to the fact that these services can be supplied by commercial enterprises, which function according to the market laws (Popova, 2011).

The goal of the research is to discover pros and cons of each strategy.

According to client-oriented approach the student is treated as a client, correspondently, his wishes and vision of higher education become in the centre of attention of university (Gordon, 1998). The programmes are treated as product which is sold to the customers – students. This approach is very beneficial in the short run for commercial universities, since this education attracts students, requires less financial investments in equipment, does not require additional investments in market research (Popova, 2011). Nevertheless, this approach results in inevitable decrease in education quality and inevitable loss of reputation of the university in the long run (Frantz, 1998; Briksin, 2011). This fact in its turn will result in financial losses and in decreasing market share (Cua, 2017).

Product-oriented approach treats the student as a product of the university, the study programmes become just the tools and the customer is labour market. This strategy is very expensive in the short run. To begin with, it requires investing intensively into marketing research to understand or even forecast the needs of the labour market; moreover, it might be necessary to form, to mould the demand for the labour, produced by the university. Then, the requirements of the market may not coincide with the ideas of potential students about easy non-problematic study; therefore, the university must explain them why they are interested in obtaining degree in this area. Then, these directions sometimes require the special equipment, laboratories, and so

on, and university must invest in them. The flow of student is not very high the first years of implementing this approach. Moreover, there is a necessity to introduce certain incentives for the students – for instance, free education for the students who are successful in passing entrance exams (Popova, 2011). The situation in the long run is crucially different. The university creates the real brand, the graduates are well-employed, all students wish to study there and are ready to pay significant money for this education, they are ready to satisfy to all the requirement of the faculty, the strong reputation is created, and so on (Burnett, 2014; Semenovskikh, 2014).

The discussions about the choice of the strategy are very urgent, they stay in the centre of attention of universities, labour market, employers. Every strategy has its own followers. And every university makes a choice in accordance with its long- or short run objectives.

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DEVELOPMENT OF SOFT SKILLS IN THE PROCESS OF SPECIALISTS TRAINING

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Keywords: Soft skills, specialists training, emotional competences, social skills

In recent years the competence approach in professional education has become a prerequisite of quality training of specialist. The difference between a competent professional and a qualified one is that the competent professional has not only the knowledge, competences and skills of a certain level, but also ability and willingness to implement them in the work process (Пиралова, 2009). The main attention is focused on the links of competency and content of education.

The employers discuss actively the value of not only professional competence, but also additional knowledge and skills, which can be manifested via the personal experience, and responsibility, critical thinking, ability to coordinate the activities with others, managing emotions, etc.

They are defined as "soft" skills, capable of contributing to and facilitating the successful implementation of functional responsibilities of specialists. However, many employers have noted that the job applicants have the low level of soft skills development to occupy the available vacancies (Manpower Group, 2013).

Soft skills are acquired competences which can be developed through further education. Opposite to hard skills, including the technical competences related to the performed activities in the field of formalised technology, soft skills are applied in any activity, any profession and any interaction between people.

According to the employers' opinion, there are five principal skills which are likely to increase the probability of success in all spheres:

- social skills;
- communication;
- higher-order thinking skills (including problem solving, critical thinking, and decision-making);
- supported by the intrapersonal skills of self-control;
- positive self-concept (Lippman et al., 2015).

The emotional competences can be attributed to the Soft skills; in their turn they are also responsive to development (Чуланова, 2017). Soft skills refer to a wide variety of skills, competencies, behaviour types, attitudes and personal qualities which allow people to navigate effectively within the

organization, deal well with others employees, work efficiently and achieve their goals. Moreover, the higher position and better career the person has the more important for him to possess Soft skills for performing the duties.

This paper analyses the structure of the Soft skills, particularly their formation in the process of specialists training; the research focuses on the development of emotional competence.

The study focuses on the development of educational programmes, on the results of the study of future professionals and makes recommendations for inclusion in the learning process of required forms and methods of learning for soft skills development in accordance with the expectations of employers and the labour market.

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FINANCIAL TECHNOLOGY: NEW CHALLENGES IN EDUCATION OF FINANCIAL MANAGERS

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Keywords: financial service, financial technology, financial manager, learning outcomes

Financial technology, which is known today under the term 'FinTech', describes a business that aims at providing financial services using software and modern information technologies. After web developments in the eighties and nineties, cloud computing and digitalization of economies and society through smartphones and social network in the last twenty years, a new wave of start-up in financial areas has developed a new business model, where technology is creating value not only supporting business processes. This is quite natural in financial industry, where money is the basic raw material and product, and money is information. These are regarding banking business, giving possibility of obtaining loans, lending money in a peer to peer connection, insurance activities, making possible to obtain services through smartphones, favouring crowdfunding for new initiatives (Merlino, 2017).

New „FinTech" firms are using *new* mobile, social and digital technologies to find *new* customers and offer them *new* financial products that meet their needs in a fast-changing world. The global FinTech market is quickly evolving in threatening to turn traditional financial fields like banking, lending, asset management and insurance upside down. The term "FinTech" might be both most-hyped and under-estimated term in industry has seen in decades (Capgemini, 2017).

What is FinTech exactly? There is no universal definition of FinTech in the scientific literature; however, in contemporary economics the role of information technologies in the world of finance is significantly growing. The National Digital Research Center in Dublin, Ireland defines it simply as *innovation in financial services*. More specifically, FinTech companies often use technology to disrupt incumbent financial systems (Neuman, 2015).

Some other definitions of FinTech are given below. Fintech is a new financial industry that applies technology to improve financial activities (Schueffel, 2016). FinTech are the new financial services firms that are less than five years old and have a relatively small but rapidly growing customer base (Capgemini, 2017). FinTech, the word which originates from marriage of 'finance' and 'technology', designates currently a novel, innovative and emerging field which attracts attention from the publicity (Zavolokina et al., 2016).

Digital finance offers substantial benefits for individuals, small business, providers of financial services and government. Digital financial services can connect 1.6 billion individuals to the formal financial system in emerging economies. "Delivering financial services by mobile phone could benefit billions of people by spurring inclusive growth that adds $3.7 trillion to the GDP of emerging economies within a decade" (Manyika et al., 2016).

FinTech attract great investment and investors' attention. Investment in FinTech has grown exponentially and this investment is giving entrepreneurs a platform to disrupt traditional financial services and to better serve clients through personalization, time of service and greater security. In few years a number of new companies have been developed and at the end of 2016, 42 were already present in Wall Street stock exchange, so it is possible to apply their multiples to evaluate other start-up in the field (Merlino, 2017). Fintech start-ups attracted $12 billion of investment in 2014, up from $4 billion the year before (The Economist, 2015). The research of Roland Berger shows that global investment in this new field can be estimated in 1,162 billion USD dollar in 2015 (Berger, 2016). One of the reasons of this phenomenon is that digital technologies cut the cost of providing financial services by 80 to 90 percent (Deloitte, 2016).

The authors agree with Chris Skinner (2016), who wrote that "potential of FinTech is considered to shape a brighter future in finance". Based on analysis above, we can conclude that financial technology is among the world's fastest growing industries; this fact means many start-ups and job opportunities for graduated students. In financial technology, the majority of successful applicants have a computer science degree. However, for less technical roles, to understand better an essence of financial products and to evaluate a situation in the global financial market, contemporary financial services industry considers more economics and management degree disciplines. At the same time, the study program in Economics should move towards curriculums with greater information technological training.

This article examines the nature and the role of a new financial technology that becoming more and more popular around the world of finance. The main findings of the research are:

1. FinTech is clearly the real competitor in traditional financial activities.
2. What is necessary to do for improving the content of curriculum and teaching methods for achieving higher level of learning outcomes of the future financial managers studying contemporary finance?

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THE ROLE OF GAMIFICATION IN A MODERN UNIVERSITY STUDY PROGRAM

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Keywords: gamification, knowledge, digitalization, new situations, motivation for learning

Today there is much discussion about improving the quality of education. The importance of life-long learning today is explained by the fact that in a rapidly changing modern world living conditions are closely related to the level of education.

Digitalization of education is a logical development of the general process of digitalization of society. It is in the last decade that the digitalization of higher education has become widespread around the world. The reason for this is the availability and ease of use of different types of modern video, audio equipment and computers in the education system.

In 1980 Thomas Malone published the study "What Makes Things to Learn: A Study of Intrinsically Motivating Computer Games." Later, in 2002, the Woodrow Wilson International Center for Scholars, based in Washington D.C., established the Serious Games Initiative to explore the application of game principles to public policy issues. From that initiative, gamification for education emerged and gradually evolved into a field of study (Learning Theories, 2016).

The gamification of learning is an educational approach to motivate students to learn by using video game design and game elements in learning environments (Shatz, 2015). The goal is to maximize enjoyment and engagement through capturing the interest of learners and inspiring them to continue learning. Gamification, broadly defined, is the process of defining the elements which comprise games that make those games fun and motivate players to continue playing, and using those same elements in a non-game context to influence behaviour. In educational contexts, examples of desired student behavior, which gamification can potentially influence, include attending classes, focusing on meaningful learning tasks, and taking initiative.

Gamification in education offers many possible benefits, including the following:

- students feel ownership over their learning;
- more relaxed atmosphere in regard to failure, since learners can simply try again;
- more fun in the classroom;

- learning becomes visible through progress indicators;
- students may uncover intrinsic motivation for learning;
- students can explore different identities through different avatars/ characters;
- students often are more comfortable in gaming environments (Learning Theories, 2016).

At present, the use of approaches and methods that form the skills of independent knowledge retrieval, the skills of gathering the necessary information, putting forward hypotheses and drawing conclusions, is becoming increasingly popular in the educational process.

The purpose of the reserach was to study the experience of applying gamification in the university educational process.

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CAREER MANAGEMENT AND COUNSELLING IN HIGHER EDUCATION

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Keywords: university, career management, career development opportunities

An increasing number of graduates with higher qualifications contributes to strengthening the competitiveness of the European economy (The Role of the Universities in the Europe of Knowledge, 2003). However, the transition from higher education to the labour market may sometimes become a problem, and students now hope to have a more rewarding return on their investment in higher education in terms of academic quality and employability. Modern universities have to become more flexible for satisfying the needs of new student populations (The State of Higher Education 2014: Executive Summary, 2014). This is determined by increasing demand for improved availability and convenience, as well as direct application of the educational content to work settings.

Career management activities are often viewed as peripheral activities compared to basic activities of a higher education institution, which include education and research. They are often not properly integrated into the university's overall strategy. As a result, career guidance services are not synchronised with other services provided by the university, or with the services offered by the local labour market consultants. Besides, the role of the private sector in providing career information and guidance may be underestimated. So career management and counselling can be regarded as a special focus area of the university's all-inclusive strategy. More attention should be paid on providing university graduates with the necessary tools to successfully launch and manage their professional career. Various professional development opportunities should be accessible to enrolees, students and alumni for improving a wide assortment of transferable skills including career development skills. The students' organizations such as the Students Parliament could be also integrated in the process of career guidance.

Comprehensive career guidance is aimed at teaching people to plan their careers, making information about the labour market and educational opportunities more accessible by organising it, systematising it, and making it available when it is needed (Career Guidance: New Ways Forward, 2003). Effective use of career information is aimed at avoiding the risk of "getting lost" in the job search process. In a university, career management process

should be viewed as a proactive support for all students. It should also be based on collection and analysis of objective data regarding career-related issues, which also include students' attitudes towards their future career prospects as in their native country as abroad.

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PRACTICAL SITUATION AS THE METHOD OF ACTIVE LEARNING OF MANAGEMENT DISCIPLINES

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Keywords: Practical situation method, management education, teaching methodologies, skills, experience

A manager's work is to make various decisions, requiring profound and multifaceted diagnostics of practical situations. In this case, we mean a set of interrelated factors and events, which characterize a certain stage of management activity and require a manager to make estimates and orders.

Any practical situation from the sphere of management can be used in the educational process to develop skills in analysing information and developing the ability to make managerial decisions (Kuzmina-Merlino, 2016).

The method of the practical situation analyse contributes to:

- the development of the critical thinking skills;
- the theory and practice combination;
- the different position and points of view demonstration;
- the appearance of confidence in the possibility to solve complicated management tasks.

Special interest for the education process of such discipline as marketing is represented by practical situations taken from real life of firms and by offering a real life solution. In this case students need to find its solution and justify a possible answer.

In order for a real situation to be used in the educational process, the rules of description of proposed events are created (Панфилова, 2004). A situation should be interesting for subjects and accompanied by specific data, such as the name of a company, information about activities, time and date of events. It is necessary to dramatize the situation; the description of the conflict and the different points of view are the obligate moment. At the same time concretization of specific facts should not interfere in the appearance of independent conclusions and proposals. The style of presentation should provide an operative acquaintance with the description of the situation. The volume should not exceed 1,5-2 pages together with statistical data and characteristics.

Generally, situational solution, developed on the analysis of the actual activities of a company, allows to study the best examples of magament experience.

In summary, therefore, the method of active learning, based on the use of practical situation, can be considered an important part of professional training of managers and students, studing management.

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Session 4

Topical Issues of Specialists Professional Training

ACTUAL ISSUES OF AVIATION SPECIALISTS' TRAINING IN THE REPUBLIC OF KAZAKHSTAN

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Keywords: civil aviation, human factor, proposals, professionalism

At the current level of aviation development, ensuring the safety of flights is a complex and urgent problem. The lives of passengers and crews depend on the level of safety, and also on the efficiency of air transport. Based on this, requirements to safety are becoming more stringent.

One of the key factors in ensuring the security of air transport is the qualification of aviation personnel. In 2016 there were 63 aviation accidents in civil aviation of the states-participants of the interstate Agreement on Civil Aviation and on the use of airspace, including 28 fatal crashes, in which 74 people were killed (Interstate Aviation Committee, 2017).

According to preliminary estimates, accidents caused by the human factor in the CIS countries constituted about 94% in 2016 (Interstate Aviation Committee, 2017).

Human factor or the professionalism of the CA specialist remains one of the main causes of aviation accidents in air transport.

Training of specialists for air transport in the Republic of Kazakhstan is carried out by several education institutions: 5of them are in Almaty, and one of these is a higher education institution; there are three institutions in Astana, one in Atyrau, one in Shymkent and 1 in Uralsk.

The Academy of Civil Aviation is the only higher civil aviation training institution in Central Asia, where students are trained in all aviation specialties. Also there is a college that provides education of specialists of the same profile, after they completed secondary special education, as well as retraining and advanced training of specialists of civil aviation enterprises. But there are some problems in providing education for future specialists in the air transport which cannot be solved by a single university.

The dual system of training of specialists recommended for application in terms of involving the actual aviators practice in the training process contradicts the recommendations of the Ministry of Education and Science of the Republic of Kazakhstan, reducing the required mandatory percentage of "graduation" of teachers at the department of the university (WEB-version of the IPS "Legislation of the CIS countries", 2017).

The discrepancy of legislative base: currently there is no legislative mutually beneficial relations of production and training in Kazakhstan. Therefore, training programs for various specialties in civil aviation are not coordinated with employers, the number of specialists is not controlled by the civil aviation committee and does not meet the needs of the industry, and the practical base for training students at civil aviation enterprises is not enough (The website of the Government of the Republic of Kazakhstan, 2017).

This led to the decrease in the professional requirements for data to civil aviation specialists and affected the nature of their training. Which in turn affects the level of air transport safety. Even the super trained pilot will be unable to ensure the safety of flight, as the flight is completely dependent on the activities of "non-aviation" personnel who carried out the activities of the organization, implementation, maintenance and service of air transportation.

Even the most highly trained pilot can not fully ensure the safety of his flight, since in flight he depends entirely on the activities of "non-aeronautical" personnel, who carried out activities for the organization, implementation, maintenance and service of air transportation.

To increase the level of security in air transport by solving the problems of training, carrying out activities in the organization, implementation, maintenance and service of air transportation I put forward a number of proposals. The creation of a recommendation council of aviation specialists with relevant theoretical skills and practical experience in the civil aviation system to develop key recommendations for the executive branch, authorized in the field of air transport and universities to train civil aviation specialists, created to develop recommendations for executive bodies authorized in the field of air transport and universities to train civil aviation specialists.

The introduction of proposals will raise the level of training of workers for the aviation industry in the civil aviation of the Republic of Kazakhstan, which is one of the main factors for ensuring the safety of air transportation.

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PRACTICE AS ONE OF THE BASIC COMPONENTS OF PROVISION OF PROFESSIONAL COMPETENCE IN ENGINEERING PROGRAM EDUCATION

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Keywords: Education, professional competences, additional practical skills

The preparation of students in engineering programs should optimally combine both theoretical training and practical skills. That means that the specialist should not only know "what to do", but also be able "to do." This is especially important in the training process of aircraft maintenance specialists.

Students should gain minimal practical skills while studying in accordance with the requirements of the academic program. According to the requirements of the current legislation, not more than 50% of contact hours of the total amount of the contact hours are provided for studying a particular discipline (1 credit point of the Republic of Latvia is equal to 40 academic hours). Practical classes are given 8 hours per 1 credit point.

From the authors' point of view, the amount of practical classrooms included in the academic programs is not sufficient to form the required professional competencies of an aircraft maintenance specialist. This cause incompliance with the requirements of professional training of aircraft maintenance specialists in accordance with the EASA Part-66 syllabus (COMMISSION REGULATION (EU) No. 1321/2014 and its related annexes).

To obtain additional practical skills in the aircraft maintenance field during the studying process at a university, students can work in any of existing aircraft maintenance and repair organizations outside of classroom hours. On the other hand, this action makes it possible to make necessary adjustments to the theoretical part of the education process of aviation specialists.

In this regard, close cooperation between an education institution and internship organization is highly important. Transport and Telecommunication Institute (TTI) has accumulated sufficient experience of cooperation between the institute and aircraft maintenance organizations in order to achieve the main purpose, which is "provision of professional practical training of students."

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DEVELOPMENTAL EDUCATION IN AERONAUTICAL EDUCATION

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Keywords: creativity, invention, the system of developmental training, aviation education, technology of self-education

Ground maintenance of aviation equipment includes the identification of the causes of failures and malfunctions and their elimination by a regulated technology. The training of aviation specialists in the field of technical operation of aircraft is part of aviation education and has an engineering, that is, a creative direction.

Student rises in training activities to a new, higher level - from studying under the guidance and daily supervision of the teacher to the independent development of the scientific picture of the world, masters methods of teaching and self-learning. The mentor should help to expand creative potential of student, putting before the student educational tasks that require a research approach for their solution. The educational activity of a student at a university must be built in such a way that not a teacher, but a sudent becomes an expert of higher qualification. The lecturer does not retell "all science", can not and should not do this, but gives that material, guided by which, the student finds the necessary scientific knowledge in the literature for mastering. In addition, after listening to the lecture, a student will learn how to project scientific positions into real life, analyze the latter and evaluate it from these positions.

The same guiding threads are received by the student from the teacher in other occupations (practical, laboratory, etc.) in order to independently read the literature, to penetrate into problems, to solve them in relation to their future professional life and activities. Thus, the teacher helps the student to develop the appropriate skills to learn on his own, which means that it is slightly different than methods in the secondary school. And as for knowledge, it will remain in memory if they are consciously acquired, and if it is forgotten, it will be restored, being on demand by practice. It is the ability to learn independently, finding the knowledge necessary for the activity, and represents the fruit of developmental education, when the student not only learns a lot, but also develops as a professional, as an active, searching, creative person.

The most important condition for developmental learning, as its theorists believe, is *the content* of the educational material. It must be such that its mastering develops the basis of thinking in students. Hence, the primary

methodical task is to select the theoretical material with the help of which the teacher will emphasize the students' attention when starting to study the next problem, topic or new section. The content of this material can be either expressed in a lecture, or worked off in practical and laboratory exercises. Education, focusing on the final product in the form of the main constructive and technological neoplasms, is developmental training, and the methods of its implementation are called innovative (innovations are neoplasms). Knowledge is the material basis of development, and development is one of the conditions for successful mastery of knowledge.

Classes that demonstrate multimedia pictures, illustrations, photographs, collection, computer programs embodied in the virtual world, as a rule, are at an increased interest and attention of all students. Many provisions, at first glance difficult, with the skillful use of computer technology tools are available and understandable. The clarity of the material, provided in a computerized presentation, contributes to the strength of mastering knowledge. Examples and images shown on the screen are remembered more easily and permanently held in memory.

The report examines examples of the study subjects for Bachelor program "Aviation Transport".

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PROFESSIONAL BACHELOR LOGISTICS PROGRAMME UPGRADE ON THE BASE OF COMPETENCES APPROACH

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Keywords: Professional study programme, upgrade, competence- based approach

In the field of education and especially of higher education generally there is continuous discussion which knowledge and skills students need and how to organize and perform study processes. It is the main subject of the typical study programme life cycle time intervals:

- generation, design and preparation of a new study programme,
- licensing of a study programme,
- accreditation(evaluation) of a study programme,
- organization and performance of study processes,
- self-evaluation of a study programme.

In European higher education space a very important terminology also includes Learning Outcomes and Competences of future professionals of every field. Usually all the parties involved in the procedures mentioned above (Higher Education Institution, Ministry of Education, National Centre of Study Programmes Evaluation, and invited external or internal experts in the field of study programme etc.) try to get a consensus of all evaluated parts of the programme: Programme aims and Learning Outcomes, Curriculum design, Teaching staff, Facilities and learning resources, Study process and students‘ performance assessment, Programme management and others.

For professional study programmes main structure of the programme could be formed with the help of professional Standards, in our case national (Loģistikas struktūrvienības vadītāja profesijas standarts, 2010) and international (EUROPEAN QUALIFICATION STANDARDS for LOGISTICS PROFESSIONALS, 2014) Standards systems.

From one side Standards could accelerate the process of making key points in the professional study programme, but from the other side they could not help in case of appearance and implementation of emerging technologies in the field of the programme and possible specialization. In this case the competence-based methods could be more attractive with broader possibilities (D. D. Stevens, A. Levi, 2005).

On the base of this competence Authors try to upgrade professional bachelor programme “Transport and business logistics” diversifying it into two specializations – “Supply Chain Management” and “Transport Entrepreneurship”. In this paper authors also propose modernization of study plans, curriculum of subjects etc.

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THE POSSIBILITY OF DISTANCE LEARNING IN AIRCRAFT SPECIALISTS TRAINING

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Keywords: education, professional competences, additional academic competences

Currently three programs for training aviation specialists are running in Transport and Telecommunication Institute are running:

- Basic training conducted in accordance with Part-66 requirements (COMMISSION REGULATION (EU) No 1321/2014);
- Professional education (study programme of the first-level professional higher education Technical Maintenance of Aircraft Transport);
- Academic education (study program Bachelor of Engineering Science in Aviation Transport).

For all three, only full-time education is provided. Distance learning is not provided. This is explained by the fact that in the process of training, large amount of practical training (laboratory work, practical training) with the use of special equipment and an aviation simulator are required to obtain professional competences.

But graduates of the Technical Maintenance of Aircraft Transport program have the opportunity to undergo a special undergraduate program (duration of study is 1 year 6 months) and complete the bachelor's degree.

The paper considers the possibility of implementing this shortened program in distance learning. Such training becomes possible only for the specified program, due to the following facts:

1. As a rule, graduates of the professional program work in organizations for aircraft maintenance. For the most part, this is shift work.
2. During the training in the study programme of the first-level professional higher education students will acquire full the professional (practical) competencies necessary for the formation of a specialist not only on the basis of APAC / TSI, but also in the practice in aviation maintenance enterprises (this practice is envisaged This program).
3. It is only necessary to replenish competencies in the academic field. The shortened program is designed in such a way that it is necessary to study disciplines that do not require the use of special equipment. All practical exercises are calculation works.

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PROFESSIONAL LICENSES AND HIGHER EDUCATION PROGRAMMES

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Keywords: higher education, professional education, integration, certification

Study program strategy is usually determined by demands of different documents, labour market demands, development strategies, our country's demands and, of course, student preferences, as a customer. More and more professions are demanding not only professional knowledge or skills given by higher education institution and proved by having higher education diploma but also the availability of specific certificates or licences.

Usually educational content needed to obtain certificates is similar to professional study programmes content and so there is a possibility of integration one into another. Riga Aeronautical Institute (RAI) has introduced a unified approach to all study programmes to make the process of integration of demands for licensing or certification easier.

Necessity to have a certificate is not a very common demand among the whole variety of professions, so there are not a clear way written in higher education documents how to integrate such modules into higher education program and satisfy demands from both higher education institution and professional license issuing organisation. It means that there is some freedom of action when there is such need of integrating demands for issuing professional licence into higher education program.

So in this paper we compared one of our programs with similar programs from other countries in order to reveal common and different aspects of study programmes and to show how we managed to realise integration of professional license demands into our study programme.

MODELING OF MECHANISMS USING SOME APPLICATIONS TO RESOLVE EDUCATIONAL AND SCIENTIFIC INVESTIGATION TASKS

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Keywords: modelling, science, students, creative abilities, mechanism

Scientific objectives of some software applications are the following: to attract the teaching staff of the Institute to the tasks of solving problems of modelling of behaviour and diagnosis constructions, gas dynamics and flow parts, modelling of behaviour of materials; to use questions in order to solve these problems in practical classes with students, draw up the results of the work in the form of publications and attract to writing of scientific articles based on the results of research of enterprising students [Meerovitch M.I., Shragin L.I. 2000]

The main directions of most famous application CAD systems are defined as a constructive simulation, modelling of gas dynamics, reliability-diagnostic modelling and simulation of the behaviour of materials.

As an example of typical software we consider Solidworks as such are popular among design engineers and specialists. Solid Solutions of SolidWorks is a good practice and main principle, which is the world most popular CAD (computer aided design) software. It launches a search for larger facilities after outgrowing its based on assembly drawings and found them in some unified area. SolidWorks is a solid modeler, and utilizes a parametric feature-based approach to create models and assemblies. The software is written on Parasolid-kernel.

Design intent refers to how the creator of the assembly wants to respond to changes and updates. For example, you would want a hole at the top of a device to stay at the top surface regardless of the height or size of the device. SolidWorks allows the user to specify that the hole is a feature on the top surface and will then honor their design intent irrespective of height they later assign to the part.

Building a model in SolidWorks usually starts with a 2D sketch (although 3D sketches are available for power users). The sketch consists of geometry such as points, lines, and arcs. Dimensions are added to the sketch to define the size and location of the geometry. Relations are used to define attributes such as tangency, parallelism and concentricity. The parametric nature of SolidWorks means that the dimensions and relations drive the geometry, not

the other way around. The dimensions in the sketch can be controlled independently or by relationships to other parameters inside or outside the sketch. In an assembly, the analogue to sketch relations is mates. Just as sketch relations define conditions such as tangency, parallelism, and concentricity with respect to sketch geometry, assembly mates define equivalent relations with respect to individual parts or components, allowing the easy construction of assemblies. SolidWorks also includes additional advanced mating features, which allow part assemblies to accurately reproduce the rotational movement of actual parts. Finally, drawings can be created either from parts or assemblies. Views are automatically generated from the solid model, and notes, dimensions and tolerances can then be easily added to the drawing as needed. The drawing module includes most paper sizes and standards. SolidWorks files could convert use some most popular 3D pdf file format, which could become a great idea to distribute some sketches or assembly drawings.

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Session 5

Theories and Methods of Teaching

IMPLEMENTATION OF THE BASIC PRINCIPLES OF "TUNING EDUCATIONAL STRUCTURES IN A EUROPEAN PROJECT" INTO EDUCATIONAL STANDARDS IN LATVIA

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Keywords: Tuning, educational structures, educational standards, module

The basic principles of the Bologna process in recent years have been most consistently implemented in the large-scale international project *Tuning Educational Structures in Europe*.

The name *Tuning* is chosen for the process to reflect the idea that universities do not and should not look for uniformity in their degree programmes or any sort of unified, prescriptive or definitive European curricula but simply look for points of reference, convergence and common understanding. The protection of the rich diversity of European education has been paramount in Tuning and in no way seeks to restrict the independence of academic and subject specialists, or undermine local and national authority (Tuning Educational Structures in Europe - tuning project, 2006; Tarazona, 2012).

Programs developed using the Tuning methodology are oriented towards the development of general (universal) and special (professional) competencies of graduates and, in most cases, are modular. The modular system has an important quality – it is transparent in terms of learning outcomes and has sufficient flexibility to meet the individual needs of students and employers. The module is a relatively independent (logically completed) part of the educational program, which is responsible for the formation of a certain competence or group of related competencies. A modular educational program is a set of modules aimed at forming the competencies necessary for assigning a certain qualification.

Within the framework of the Tuning methodology, five types of modules can be distinguished: 1) main modules comprise educational disciplines reflecting the core of the studied science; 2) supporting modules supplement main modules; 3) modules of organizational and communication skills are focused on mastering skills for which there is demand in one or another professional area; 4) specialized modules have the opportunity to choose a student based on their interests; and 5) modules of transferable skills are designed to develop those competencies that are necessary for the approximation of theory and practice. (Hanft, 2014). The listed classification of modules is given by many authors (Brinkman, 2012; Fischer, 2012) and is of theoretical nature.

In practice, these principles are specified in educational standards of European countries. In Latvia, relevant changes have been made to educational standards by the Cabinet of Ministers Resolution No. 240 of May 13, 2014 (Noteikumi par valsts akadēmiskās izglītības standartu, 2014).

The introduced changes predetermine the need to improve existing educational programs in the direction of strengthening their interdisciplinary and modular nature.

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DEVELOPMENT OF ACCOUNTING METHODOLOGY ON THE BASIS OF THE COMPANY BALANCE SHEET MODEL

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Keywords: information need, balance sheet, evolution, theory, accounting, model, assets, liabilities, capital, profit

The modern conditions stipulate the growth of the informational requirement of the society for obtaining the reliable results of the enterprise activity, its financial position, the fair value of its assets and liabilities, and, as a result, the probability of bankruptcy.

At the same time, there should be noted a certain dissatisfaction of entrepreneurs with the information reflected in the balance sheet. The balance sheet today is a restrictor of information capabilities of accounting (Shubik, 2011).

The goal of this study is to identify the ways of expanding the information capabilities of the current model of the balance sheet.

The subject of the study is the evolution of the balance sheet formation.

The balance sheet as an accounting model of the enterprise is used in the period of existence of the double-entry paradigm, founded by Luca de Pacioli (1494). Nevertheless, summarizing the practice of accounting, Pacioli, in his famous Treatise on Accounts and Records, described a double entry system not as a reporting form which is based on the balance between the firm assets and liabilities and equity (Пачоли, 2009).

Therefore, the formation of modern accounting principles should be analysed consistently, assessing the theory of the dynamic balance of Eugen Schmalenbach (1873-1955) (Шмаленбах, 2010), the theory of the two series of accounts by Johan Sherr (1846-1924) (Шер, 1925), the theory of the organic balance of F. Schmidt (1882-1950), the conceptual frameworks of the balance formation by the modern Anglo-American school of accounting (Соколов, 2010).

The study shows the historical development of the balance from a simple confirmation of the correctness of accounts to the model of the enterprise presented as the ratio of its assets to the sources of their formation.

As a result, the author concludes that the current balance sheet in its static-dynamic version does not satisfy the informational needs of modern users of reports.

A change in the existing situation is possible by conducting a study, identifying, on the one hand, a set of information requests, presented by the users of accounting statements who are not satisfied with the modern business practices, and on the other hand, the boundaries of the accounting model of the company requiring changes.

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APPLICATION OF PERSONALITY TYPES IN INDIVIDUALIZING TRAINING PROCESS IN HIGHER EDUCATION

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Keywords: Higher education, students, Big Five, personality

One of the key discoveries of social psychology is the acknowledgement of individual differences. The result of the development of cognitive and neuro-cognitive science is the acceptance of the notion of individual differences' being partially innate and partially shaped by the environment. What this suggests for the educational process is that there is an inborn component in each student that makes him/her different from the rest of the population. Therefore, to consider that all different personalities of students can easily adapt to one pattern of course organization might be questionable. If so, to enhance the quality of education, particularly, higher education tutorials, it is important to attempt to implement the notion of individual differences of students into the training process.

Because it is beyond the scope of higher education to offer degrees through private instructions, one approach to attaining the goal of implementing individual differences is to categorize students into a few groups based on differences in personality of group members. The effect of student personality on the study process has already been acknowledged in academic literature (Palma-Garcia and Hombrados-Mendieta, 2014). Therefore, the next step is to categorize students' personalities. Albeit there are various approaches to this matter, the one adopted here is based on the Big Five psychometric personality test, which has widely been used in recruitment, job satisfaction research (Sutin et al., 2009), addictions (Terracciano and Costa, 2004) etc. The test distinguishes 5 continua of personality dimensions – extraversion vs. introversion, neuroticism vs. emotional stability, agreeableness vs. antagonism, conscientiousness vs. lack of direction, intellect with openness to experience vs. closeness to experience. By asking students to complete a shortened version of a questionnaire or through classroom observations an instructor might gradually gain an insight into most evident individual and group personality differences of students. Then, while following the general course aim that must be consistent with the requirements of accredited higher education programs, an instructor should attempt to use the personality knowledge when selecting tasks, organizing classroom activities and developing homework assignments. This knowledge

could also be used to identify plausible roots of challenges in academic material acquisition, predict future areas of academic weaknesses of groups of students and suggest more effective ways to the development of academic creativity. Thus, the aim of the paper is to demonstrate the ways in which the Big Five test has the potential of contributing to the formation of more student-oriented training process.

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ENGLISH ARTICULATION OF DRAVIDIAN LANGUAGES' SPEAKERS

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Keywords: Dravidian languages, pronunciation, English learners, phonology

Pronunciation is a key factor for understanding in speaking foreign languages. People pronounce words differently depending on their education, social background, physical abilities, but the major role is played by the articulation of their native language. Languages can differ in many ways. They may use different sounds, they may make words in different ways, they may put words together to form a sentence in different ways, and that's not all. When we talk about different accents we majorly think about consonants and vowels and how they are combined in a word.

The focus of this paper is to observe some factors that influence English pronunciation of Dravidian Languages speakers. Dravidian languages are agglutinative languages (Thomas Lehmann, 1989), they differ radically in their phonology and morphology from Indo-European languages and have less in common with English than speakers of German, Italian or Russian. That way, Dravidian speakers come across some additional problems learning English. English is a second language in countries with some or part of the population speaking Dravidian languages. And despite of some other ten different languages in their countries people want to speak English. For the majority of them speaking English give additional privileges and opportunities. It also increases their social status (Romanova, 2015).

There are four consonants in Dravidian languages that do not exist in English and at least two vowels depending on the dialect that do not exist in English. Also, some diphthongs are shorter and the pronunciation is slightly different: it is almost a long vowel. Dental fricatives are replaced by soft sounds; alveolar sounds are harsher (Kiran Babu Ganta, 2014). There are no aspirated consonants in Dravidian languages, though English consonants /p/, /t/, and /k/ are aspirational. Dravidian language speakers voice any consonant depending on their position and in English we voice just certain consonants such as /b, d, g, z/. There is no consonants /z, f/ in Dravidian family (Swan and Smith, 2001), which are actively used in English. So, mispronunciation can lead to confusion.

English has a relatively big amount of one-syllable words where the incorrect pronunciation can change the whole meaning and lead to

misunderstanding. Also, the stress system is quite different from the one in Dravidian languages. Some syllables normally unstressed and sounded as /ə/ may be sounded as /a(:)/ (or, /o/, /u/, /e/ or /i/). For example, the word “camera” (/ˈkæmərə/) may become “/'kæməra(:)/” (Kiran Babu Ganta, 2014). The first syllable may be emphasized rather than the usual second or third. Examples include: "address", “cassette”, “dessert”, “museum”, “hotel” and “gazette”. One may also see differences in the allocation of primary and secondary syllable stresses.

Sentences can be formed without subject or object, without active verb, and it also adds difficulties for English learners.

Generally, to learn English for Dravidian speakers is a more complicated task than for Indo-European language speakers. It greatly influences the studying process and leads to multiple questions and repeating. To avoid general confusion it is recommended to use written forms for testing and examining students’ knowledge.

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FORMATION OF EDUCATIONAL RISKS IN HIGHER EDUCATION

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Keywords: Risk, uncertainty, students, higher education, decision making, educational risks

The risks created by the uncertainty of reforming the system of higher education are mainly associated with the lack of clearly defined and fully implemented principles capable of improving the process of obtaining education and then making the role of the university for the further professional life understandable to the student. In particular, the main declared goal of the reforms is improving the quality of education, yet the interests and needs of all subjects of education are excluded from this concept, and only the interests of employers as final consumers of educational services are taken into account. A university does not provide an individual with profession under modern conditions, but it provides just a minimal set of competencies necessary for performing certain activities. Therefore, a question arises as to whether it is sufficient to provide a Bachelor programme with continuous tendency to reduce the number of classroom hours while increasing student independent work in order to allow a graduate to successfully enter the labour market and successfully conduct professional activities. It is important to reveal characteristics of educational risks of students. (Borisova, P., Bulanova, M. 2013)

One of the most significant areas of educational risks is associated with the situation of the student entering the labour market in the process of obtaining higher education. Risk is always twofold: the solution can bring both benefits and losses. It is possible to single out the main features of educational risks inherent for university students: the key risks are related to professional self-determination; the choice is accompanied by a high degree of uncertainty of its consequences; the behaviour of students in risky situations is often irrational; students believe in the reliability of certain options for action, which in most cases is imaginary one; students tend to share and even shift responsibility to professors when making decisions (Kotov, S., Kastorskaya, L. 2014).

Changes in the sphere of higher education are of special importance in the formation of educational risks. The ability of the university environment to help students make reasonable decisions under non-defined consequences is significantly reduced in the period of profound transformations. Changes in the activity of a university, its structure and educational technologies form the conditions for increasing uncertainty, since old norms no longer work and new

ones are not fully established, as they often conflict with traditional practices of participants of the educational process (Borisova, P., Bulanova, M. 2013).

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THE PROBLEM OF ROTATION OF THE TEACHING STAFF OF A UNIVERSITY

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Keywords: aging, academic staff, young tutor

The high quality of education is inseparably linked with the preparation and creation of a team of lecturers, actively engaged in teaching, educational and methodological and scientific work. At the same time, it is desirable to involve young specialists with the skills of scientific and pedagogical activity. However, at present the significant part of the academic staff of Transport and Telecommunication Institute is rapidly approaching or has already exceeded the age of retirement – 65 years.

The aging of the academic staff is a problem of various countries. A number of researchers are anxious about the age of faculty: even taking into account the general trend of aging of the workforce, academic institutions are clearly at the forefront of this process (Kaskie, B., 2016; Larkin, J. and Neumann, R., 2012; Neumann, R. and Larkin, J., 2011; Дружилов, С.А., 2011). Latvia is also under the impact of this problem. Certainly, different universities and different departments present slightly different data. But the figures indicate that in general 42% of Latvian academic staffs are over 50 years old, and 27% are older than sixty. For the academic staffs having the Doctoral Degree those figures are even higher: every second Doctor of Sciences is over 55 years old (51.5%) (IZM, 2015).

It does not mean that universities should not value their academic staffs and replace them with external employees to satisfying the short-term needs. Such approach would create conditions for instability and deteriorate the creative environment of the university which hardly optimal. In addition, the older generation of academic staffs of the department is those people who have not only experience and knowledge, but also hold academic degrees and titles. Therefore, dismissing retirees in many cases means decapitation of departments.

At the same time, while deliberately maintaining the system insularity, it is impossible to ensure its development in a rapidly changing external environment. The following objective situation is typical not only for the Transport and Telecommunication Institute, but also for many educational institutions around the world: the core problem is the fact that there are many representatives of older generation with scientific degrees at every department; there are few representatives of younger generation, and the percentage of scientific degrees is

much lower (or even zero) among them; and there is almost no representatives of middle generation (40-55 year old) with Doctoral degrees(Kaskie, B., 2016; Larkin, J. and Neumann, R., 2012).

The equalization of age balance of academic staff at this stage seems very problematic, since the middle generation (often called "the lost generation (for Universities)" in the research literature) is not likely to be attracted to the teaching due to a number of objective reasons (Larkin, J. and Neumann, R., 2012). Therefore, there has arisen the task of intensive recruitment and retention of youth at departments by means of creating the favourable conditions for career, creative and material growth. Although the prestige of scientific and pedagogical activity among young people has fallen, it is necessary to take steps to change the generation (IZM, 2015).

Unfortunately, it is impossible to offer a decent salary as a factor of teaching work attractiveness. A young tutor, who has graduated, for example, the computer technology department, will receive a salary much less than his/her classmate, who has settled into a large computer company. Therefore, according to the authors, emphasis should be placed, for example, on additional paying not only for the lectures, but also for practical researches. In this regard, it is advisable to apply the competitive system of research and scientific and methodical projects, having allocated the certain funding in order to stimulate the activity of university faculty. The young tutor should be able to continue his study at PhD programmes; therefore, the load can be reduced while retaining wages. Active involvement in scientific projects will increase young tutor creative potential and satisfy the need for scientific activity. The creation of a clear and modern academic model of career development will contribute to the retention of young teachers. Perhaps there is a reason to encourage a balance between work and family life.

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USING COMPETENCE-BASED APPROACH WHEN ASSESSING STUDENTS' ACADEMIC ACTIVITIES

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Keywords: learning process, competencies, competence-based approach, e-Competence Framework

Transition to specific person's competence-oriented education (from educational mainstream to individual education) is a new modern global trend observed in vocational education. This trend is connected with the severization of market requirements to specialist training quality. However, even with the list of competencies available, educational institutions need to develop methods that will allow one to implement the competence-based education approach efficiently.

In 2006, in response to European Commission initiative, representatives of the agencies being in charge of national expert qualification systems with regard to Information and Communication Technologies (ICT), acting jointly with major companies and research centres (Gareis, et al., 2014), had worked out the e-Competence Framework (e-CF) development program (European e-Competence Framework, 2016). The initiative was originally intended to improve the competitiveness of ICT experts. Nevertheless, today it has turned into an overall global trend covering all education sectors and not only ICT experts.

Within the framework of this research, the usage of the competence-based approach when assessing student's mastering academic course is considered.

Definition of the list of competencies should become the first stage of planning a new academic course. The created competencies should be market-oriented and should be updated with a change in market conditions.

A teacher working out teaching materials (TM) for an academic course should align himself with the target of student's reaching the corresponding competencies if the course is mastered successfully. When working out a methodological plan, the teacher carries out decomposition of competencies and decides as to the specific competencies to be acquired by student, and as to the corresponding specific form of training (a lecture, seminar, laboratory work) and the kinds of work (course paper, control work etc.). Under this approach, the teacher should work out a system of assessment criteria for each kind of academic activities. These criteria should be connected with the competencies to be mastered by student within the framework of the academic course.

Student ought to get acquainted with the list of competencies required at the beginning of mastering academic course. Since those competencies show

measurable learning goals that can be extended to practice, they promote and motivate students. Training activity appraisal makes good sense to students in terms of identification of their individual needs; as regards teachers, the appraisal gives them good professional practice in terms of the necessity of differentiated support of students mastering the academic course.

Thus, using the competence-based education approach gives teacher a chance to make clear how far a student has mastered particular competencies, and introduce amendments to the training process. The application of this approach allows students to better understand the level of their professional training and competences that require a more scrupulous elaboration. Based on the review of the literature and the experience gained, the authors propose the development of a system of evaluation criteria for various types of educational activities.

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COMPUTER ROLE-PLAY GAMES AS ONE OF THE MOST EFFICIENT TEACHING METHODS IN HIGHER EDUCATION

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Keywords: high education, role-play games, teaching methods, learning styles, immense training possibilities

Presently it is becoming more and more typical and important to search for new ways, methods and approaches for teaching students at high education establishments, which creates a new concept of the educational process.

The aim of the research is to analyze previous researches regarding computer role-play game (CRPG) implementation in higher education for the purposes of teaching students; to summarize the results and present them.

According to Alice Mitchell and Carol Savill-Smith, CRPG, which is popular among modern young people, is an excellent method for teaching and learning, because of these methods being interesting, cognitive, stimulating enjoyment, motivational and engaging for users, increasing their mnemonic abilities and improving one's memory (Mitchell and Smith, 2004).

In 2007 *International Journal of Teaching and Learning in Higher Education* published the research of Rita Kumar and Robin Lightner on *Games as an Interactive Classroom Technique*, in which authors actually measured the impact of games on student learning. The results were dualistic, both positive and negative. As for positive feedback, some students "… emphasized the need for variety, that lecture can be boring and redundant with the book, and that activities appeal to different learning styles." However, these methods for teaching got some negative feedback as well: "Games and activities are silly and degrading. As a college student, I found it childish" (Kumar and Lightner, 2007). Taking that into consideration it is clear now that CRPG should be carefully prepared in respect of contents and form, well organized and approved by all.

"Marriott International, Inc., the world's largest hotel company, launched a social game on Facebook called "My Marriott Hotel," to recruit the best candidates in hospitality." This is an example of a brilliant start of applying CRPG mechanics and techniques to achieve real-life goals; and at the same time, it is an example of a dramatic failure. "The main problem with the game was that it lacked entertainment and it failed to sustain the interest of users." (Vinodbabu, K. 2015).

Once the method is created and implemented, maintenance and improvement should be number one priority; otherwise it is doomed to fail, just like Marriott Hotel did with their "recruiting game."

The conclusion is that the method of using CRPG in higher education provides the immense training possibilities. Students naturally do not think about this. CRPG for them is, first of all, an exciting activity. But such methods of teaching make the educational process more conceptual and qualitative.

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