SOTSIAALTEADUSKOND
TÖÖSTUSPSÜHHOLOOGIA INSTITUUT
TEADUS- JA ARENDUSTEGEVUSE AASTAARUANNE 2013

1. Struktuur

Tööstuspsühholoogia instituut, Department of Industrial Psychology, Mare Teichmann

1. Hariduspoliitika õppetool, Chair of Educational Policy[1]
2. Psühholoogia õppetool, Chair of Psychology, Mare Teichmann
3. TTÜ Eesti inseneripedagoogika keskus, Estonian Centre for Engineering Pedagogy, Tiia Rüütmann

2. Teadus- ja arendustegevuse (edaspidi T&A) iseloomustus

2.1. Struktuuriüksusesse kuuluvad uurimisgrupid

1. **Tööelu kvaliteedi ja tööstressi uurimisgrupp, Quality of working life (QWL) and occupational stress, Mare Teichamnn**

1) **Academic Personnel Occupational Stress Study and Web-based Prevention System**, Mare Teichmann

- *uurimisgrupi teadustöö kirjeldus (inglise keeles)*

University teaching has traditionally been regarded as a low stress occupation. In historical point of view it could be true, but it seems not to be so at modern universities. In occupational stress literature with the focus of the sources of occupational stress in university there are not so many comprehensive studies, but most of these are well documented by majority of the literature sources. The aim of our study was to get more detailed comprehension about sources of pressure in university academics and to develop the Web-based Prevention System[2].

In order to achieve the objective we performed a pilot study in Tallinn University of Technology (TUT). The original plan was to collect the data of sources of pressure in university, as letting the academics to "speak for themselves" and to hear "the people' voice" i.e. the interview as qualitative research method was adapted. Participants named during the interview 9.95±4.53 sources of occupational stress, and we identified 90 separable sources of pressure in university academics. As the number of stressors was so large, the question arose as to whether this is a phenomenon unique to this particular university or whether an equally large number of sources of pressure exists in the academics of a university in another academic culture as well.

The second phase of the study was to carry out an empirical survey in several Estonian universities. Therefore we wanted to know whether the sources of stress are transferrable in a cross-cultural study – in other words, whether the sources of stress in university academics that are described in our previous study are also valid in a dissimilar culture. We presumed that the academic culture of Bordeaux University is significantly different from the academic culture of TUT, although the academics' work is similar, as the subjects taught in the universities are fairly similar within the faculties of science and engineering. For the empirical survey, the checklist Academics'

[1] Hariduspoliitika õppetooli nime muutus on plaanitud 2014.a. I poolaastaks, õppetooli juhi leidmiseks toimub rahvusvaheline konkurss 2014.a. kevadel. Uue nimega õppetool jääb kureerima bakalaureusõpet *Halduskorraldus ja personalitöö organisatsioonis* ning magistriõpet *Personalitöö ja –arendus* ning vastavat teadus- ja arendustegevust. Psühholoogia õppetool jääb kureerima *Töö- ja organisatsioonipsühholoogia* (ingl. k.) magistriõpet, üleülikoolilisi psühholoogiavaldkonna õppeaineid ning vastavat teadus- ja arendustegevust.

[2] The data reported here are part from the research project "Occupational stress study and web-based occupational stress prevention system for academic staff of Estonian universities" supported by Primus grant nr 3-8.2/23 from the European Social Fund.

Occupational Stressors Inventory (AcadOSI) with 90 separable sources of stress was created. The stressors were ordered randomly within the checklist, i.e. they were not classified. For responses the Likert-type forced choice 6-point scale was chosen as widely used scale in occupational stress research; the anchors we use were between "very definitely is not a source of pressure" (1 point) and "very definitely is a source of pressure" (6 points). The next step was to develop a web-based research environment with the electronic checklist AcadOSI-Estonian (http://www.enop.ee/tpi/acadosi.php) and AcadOSI-French (http://www.enop.ee/AcadOSIFrench.php). From data analysis emerged eight main factors of stress in university academics, namely University Life/Social Relationships (23 items or sources of pressure); Students and teaching (20 items); Workload (9 items); Personal Life and Professional Identity (10 items); Evaluation of Knowledge in Society (consisting of 9 items); Bureaucracy (10 items); Personal Development (4 items); Infrastructure (5 items). The framework of stress factors accounted for 53 per cent of the variability (R^2=0.53; p< .0001); the correlations between the factors ranged from 0.33 to 0.67.

Web-based occupational stress prevention system (http://www.pekonsult.ee/stress.php) was developed for decreasing the occupational stress trough offering individual assistance, advice and guidance by E-psycho-diagnostics and E-learning. The Web-based occupational stress prevention system includes (1) Occupational Stress Indicator (OSI-2), (2) individual feedback for user, (3) two digital teaching tools - "Occupational Stress" and "Coping with Stress".

- *uurimisgrupi aruandeaastal saadud tähtsamad teadustulemused (inglise keeles)*

We found that the sources of stress were not university-specific and were also not academic culture-specific. The research shows that all 90 sources of stress were involved as stressors for academics at different Estonian universities as well at the University of Bordeaux. When comparing the work stressors of the academic staff of various Estonian universities, a difference was found in the intensity of sources of pressure, but this difference was statistically not significant. Comparing the work stressors of the academic staff of Estonian universities with the work stressors of the academic staff at the University of Bordeaux, statistically significant difference was found in the intensity of such sources of pressure. For example, in the occupational stress profile of University of Bordeaux, the major sources of stress were workload, professional development, and bureaucracy. On the other hand, in Estonian universities the main sources of pressure were worries about the evaluation of knowledge in society, bureaucracy, and high workload. In both academic groups the average occupational stress level was high – more than one third of academic staff members suffered from work stress, respectively in Estonian universities 38.9 per cent and at the University of Bordeaux 39.1 per cent.

One most intriguing cultural difference was how academic staff members feel about the students – in other words, to what extent the students are a source of stress for the academic staff member. For academics in Estonian universities, students were significantly higher source of pressure than for academics from University of Bordeaux. Estonian academics significantly more blamed students for their different levels of preparation for studies at university, inadequate study skills, low level of preparation, low study/work motivation, absenteeism, ineffective time planning and time management, unconcern and lack of responsibility, low level of discipline or inadequate behaviour.

Compared to previous empirical findings described in literature, this study uncovered a remarkably wider range of different sources of stress in university academics.

- *uurimisgrupi kuni 5 olulisemat publikatsiooni aruandeaastal*

Teichmann, M.; Ilvest, J. Jr.; Dondon, P. (2013). Would university academic staff be happier without students? In: Recent Advances in Educational Methods: 10th WSEAS International Conference on ENGINEERING EDUCATION (EDUCATION '13). Cambridge, UK: WSEAS, 2013, 11 - 17.

Teichmann, M.; Ilvest, J. Jr., Soone, I. (2013). Online Occupational Stress Intervention System for Academics. In: EET 2013, International Conference on Education and Educational Technologies 2013: Greece: 2013, 87 - 92.

Teichmann, M., Ilvest, J. Jr., Lõhmus, M., Murdvee, M., Dondon, P. (2013). Monday morning e-mail syndrome in university. Mladenov, V., Tashev, T., Kolka, Z., Pulkov, V., Bekjarski, A., Christofilakis, V. (Eds.). *Recent Advances in Telecommunications and Circuit Design* (169 - 174). Greece: WSEAS Press.

2) Uued töösuhted Euroopas (NEIRE II), New European Industrial Relations (NEIRE II), Mare Teichmann

- *uurimisgrupi teadustöö kirjeldus (inglise keeles)*

Worldwide, and also within the European Union, there is a strong debate on the conditions for a creative social dialogue in organizations. Labor relations among employers, trade unions and employees in Europe are rapidly changing. And with a shift from national and sectorial to more organizational negotiations, social dialogue in organizations becomes more and more important. New organizational conflicts in which employee representatives (ERs) play a central role are emerging and therefore their role is now confronted with new challenges in the framework of the European industrial relations. Improving cooperative and innovative social dialogue within organizations in the European Commission (EC) member states is one of the main objectives of EC policy, and high on the agenda (European Commission, 2012). In this vein, an important conclusion from a recent European action is that clarifying roles and expectations between employer and ERs is needed to develop a constructive dialogue within organizations. The aim of studies was to improve the quality of social dialogue as a tool for innovation, by exploring European employers' experiences and expectations on structures, roles, attitudes and competencies of ERs. Traditions within the European member states differ strongly; however, there is a common frame as well. Understanding and learning from a cross-cultural perspective to develop new forms of social dialogue is a red line through this handbook. This handbook (presented in two volumes) should be of interest for employers, specially HR directors and managers involved in social dialogue, and equally of interest for employees' representatives, union leaders and policy makers as well as researchers and students in the field of employment relations, organizational psychology, business management, sociology, and politics among others. In the first part the focus was on describing the social dialogue system from an human resources management' (HRM) perspective in each of the participant countries. This handbook allows a deeper understanding about the context in each country as well as about the results from the interview and surveys. In next studies we take a cross-cultural approach. The analysis of these relations helps us to understand the antecedents and consequences from social dialogue in Europe. Overall, this handbook offers an up to date overview of experiences and expectations of employers in Europe on the structuring and dynamics of social dialogue. Additionally, we offer good practices for improvement of social dialogue at organizational level, as well as sectorial level in the 11 participating countries. Estonian NEIRE II study includes: (1) Historical context analysis of the labor movement in Estonia; (2) Conducting interviews with human resource managers; (3) Conducting e-survey with employers; (4) Analyzing and interpreting Estonian study results.

- *uurimisgrupi aruandeaastal saadud tähtsamad teadustulemused (inglise keeles)*

Historical context of the labour movement in Estonia was studied. When to compare the Estonian unions' membership rate with other EU countries' unions membership rates, we must admit that the Estonian employees are not highly represented by the union. Unions represent only 8.1% of the Estonian workforce. In the other words, the overwhelming majority of employees (91.9%) are not represented by the unions (OECD Statistics; Fulton, 2011). Moreover, like in many EU countries, there exists the continuing downward trend of union membership in Estonia. Due to Estonian trade unions' history, and low reputation from Soviet period both the employees and

employers assessing works councils as more democratic and innovative than the unions. Figures also make clear that works councils enjoy the higher popularity in Estonian enterprises than unions (Statistics Estonia, 2011). Comparably, in 6% of the Estonian organizations have the unions, and twice as many organizations (13.3%) have works council. The 2009 Statistics Estonia survey shows that 32.7% of employees in organizations' employing five or more employees are covered by collective agreements. At the start of 2011 there were only around 195 agreements (Fulton, 2011). However, still the majority of employees are not represented at all - not in unions and nor in the works councils. For the majority of employees in Estonia, working conditions, and in particular pay, are fixed in direct discussions between the employer and the individual worker.

We summarized the most relevant indicators pointed out by the employers in the interviews regarding the profile of the ERs. In order to better understand these opinions we start by giving an overview on the structure of the industrial relations system in Estonia: (1) Working environment specialist is an engineer competent in the sphere of working environment or any other specialist in an enterprise who has received training concerning working environment and whom the employer has authorized to perform occupational health and safety duties. A working environment specialist is full-time employee and is paid as any other employee for his/her work. Generally a working environment specialist works under the supervision of HR manager. (2) A working environment representative is a representative elected by employees in occupational health and safety issues, and his or her term of authority is up to four years. In an enterprise, which employs 10 employees or more, the employees shall elect one working environment representative from among themselves. If an enterprise employs less than 10 employees, the employer is required to consult with the employees in matters of occupational health and safety. A working environment representative is an ordinary employee, who performs his/her functions besides his/her ordinary work and is not to be paid for work as a representative. (3) A working environment council is a body for co-operation between an employer and the employees' representatives, which resolves occupational health and safety issues in the enterprise. In an enterprise with at least 50 employees, a working environment council shall be set up at the initiative of the employer and it shall comprise an equal number of representatives designated by the employer and representatives elected by the employees. The council shall comprise at least four members and the term of their authority shall be up to four years. The main employers' concerns regarding the ERs' role in Estonia are:

1. Need for professionalism.
2. Attitudes of the employee representatives.
3. Low mutual trust.
4. Lack of competencies.
5. Low prestige.
6. Regarding the EU policies, there are no differences among the sectors, there is a general lack of knowledge on these policies among all of them.

Empirical study results suggest that compared to the European average results the Estonian employees' representatives (ERs) enjoy significantly higher empowerment by management ($p < .01$), managers' need for control is lower ($p < .01$), benevolence of ERs is higher ($p < .01$), and integrity of ERs is higher ($p < .01$). One important result of survey suggests that industrial relations in terms of trust are also higher in Estonia than the EU average (there is no statistical significance). Estonian employers' representatives (HR managers) evaluate the competencies of the ERs quite highly i.e. competencies of ERs ($p < .01$) as well diversity in competencies and attitudes of ERs ($p < .01$), and ability of ERs ($p < .05$) are assessed significantly higher in Estonia than average in Europe. According to the survey Estonian results hint that the conflict management is principally towards cooperative conflict management by ERs ($p < .05$) and competitive conflict management by ERs is significantly lower ($p < .05$) than average in European survey. Estonian ERs task conflict is also significantly lower ($p < .01$) as well as relationship conflict that is lower but not significantly lower. Conflict management efficacy, and characteristics and quality of agreements in Estonia are assessed

exactly on the same level than European average. Impact by ERs on organizational issues is slightly higher in Estonia (in subscale 1 it is not significant, in subscale 2 it is significant difference $p < .10$).

- *uurimisgrupi kuni 5 olulisemat publikatsiooni aruandeaastal*

Eds. M. Euwema, L. Munduate, P. Elgoibar, E. Pender and A.B. García (2014). Promoting constructive and creative social dialogue in organizations: How to move from conflict to cooperation? Springer (in press)

In: Chapter 5: *Miguel Martinez- Lucio, Valeria Pulignano, Giovanni Passarelli and Mare Teichmann*, ERs as old boys' networks: Who are ERs representing?

In: Chapter 11: *Barbara Kozusznik, Merle Lohmus and Ana Passos*, Looking for engaged, smart and pragmatic people.

Eds. M. Euwema, L. Munduate, P. Elgoibar, E. Pender and A.B. García (2014). (2014). Employers' ideas on how to promote constructive and creative social dialogue in organizations: Developments in 11 European countries, *M. Teichmann, M. Lõhmus*, Chapter: Employee Representatives in Estonia. How are they perceived and what are the expectations by employers in Estonia? Springer (in press)

3) Tööalased emotsioonid; Emotions at Work, Kristjan Lääne

- *teadustöö kirjeldus (inglise keeles)*

While researchers have assumed that it is not possible to determine the 17 key reactants that cause positive emotional reactions, we argue that experiences, such as watching an entertaining television show or 19 working in a pleasant climate, produce their positive effects through one or more ''root causes'' of positive emotion. This study identified a 21 classification of root causes derived from reports of individual positive moments submitted by office workers throughout their workday. 23 Through identifying root causes, such as Fulfilled Expectations, Positive Self-Image, Humour, and Relief, we provide the first data- 25 driven attempt to develop a taxonomy of root causes of positive affect at work.

- *aruandeaastal saavutatud tähtsamad teadustulemused (inglise keeles)*

We identified 17 causes that are directly associated with eliciting 29 positive emotion. The different ways by which positive emotions were induced were Attachment, Auditory Aesthetics, Discovery, Euphorigenic 31 Agents, Fulfilled Expectations, Humor, Improvement, Joy of Others, Knowledge Gain, Liquid, Pleasant Cues, Positive Self-Image, Relief, 33 Synchrony with Others, Tastes and Smells, Temperature Normalization, and Visual Aesthetics. We also determined the profile of the hedonic ratings and the frequencies associated with each cause of positive emotion. Fig. 1 presents the averages 37 and spreads of the hedonic ratings. The hedonic ratings given to the causes did not differ significantly from each other, $F(10,267)=1.10$, $p= .35$. However, the incidence of causes did differ significantly from each other, $w^2(10)=339.99$, po.01. Fulfilled Expectations were reported by far the most often, at 30.5% of all the 3 common cause occurrences, followed by Improvement and Positive Self- Image, at 18.3% and 18.0%, respectively. All the other causes were reported 5 less than 10% of the time.

- *uurimisgrupi kuni 5 olulisemat publikatsiooni aruandeaastal*

Lääne, K.; Aczel, B.; Dickinson, A.; Teichmann, M. (2013). Root causes of positive emotion at work. Ashkanasy, N.; Zerbe, W.; Härtel, C. (Eds) *Research on Emotion in Organizations* (7 - 21). Emerald Group Publishing Limited.

4) Psühhosotsiaalsed faktorid tööl; Psychosocial factors at work, Mare Teichmann

- teadustöö kirjeldus (inglise keeles)

Projects of RKAS[3]:

1) Psychosocial work environment at Estonian Ministry of Interior (SM)

[3] RKAS – Riigi Kinnisvara Aktsiaselts(State Real Estate Ltd.)

The aim of the study was to analyse the current status of occupational information collected. Results of the studies make possible to improve the work environment and buildings, to plan the future buildings. Project activities focused on the use of occupational profiles emerge and were in accordance with the agreed framework: (1) an anonymous Web-based Surveys: Occupational Analysis, (2) observations: Job use "imaging", (3) the establishment on the basis of an analysis of job descriptions; (4) data processing and statistical analysis of results of the study.

2) Productivity and effectiveness of learning - related physical and psychosocial aspects of the work environment in offices and schools, *(Jarek Kurnitski; Mare Teichmann; TTÜ Ehitiste projekteerimise instituudi, Keskkonnatehnika instituudi ja Tööstuspsühholoogia instituudi koostööprojekt)*

- aruandeaastal saavutatud tähtsamad teadustulemused (inglise keeles)

1) SM employees were no working an average of 16.6% per day. Survey results suggest that more than a quarter (26.4 %) of SM employees are working elsewhere rather than using their own workplace at office. So, own workspace did not use an average of 43% working in paragraph marker employees on each day. Higher officials were less than senior officials to work at own workplace at office (statistically significant correlation, $r = 0.29$; $p < .05$).
2) Preliminary collection and review of literature concerning problems of indoor climate (temperature, humility, ventilation, etc.), office lightning, noise in office, office types, office design and configuration, sick building syndrome, and other subjects associated with research topics. Research question: how psychosocial and physical factors affecting productivity effectiveness of learning. Study is in progress, the literature is collected and reviewed - 24 special books and literature sources (134 publications).

- uurimisgrupi kuni 5 olulisemat publikatsiooni aruandeaastal

M. Teichmann (2013). Siseministeeriumi psühhosotsiaalse töökeskkonna uuringu aruanne, 74 lk. (käsikiri)

5) Militaarpsühholoogia ja NATO

- *teadustöö kirjeldus (inglise keeles)*

Preparation and contribution to NATO Advanced Research Workshop (ARW) Program Resiliency: Enhancing Coping with Crisis and Terrorism with the topic of "National resilience in multinational communities"

- *aruandeaastal saavutatud tähtsamad teadustulemused (inglise keeles)*

Completing national data and co-authoring the chapter of Stigma and Barriers to Care for NATO RTG218 about Military Suicides.

Paper presentation, IMTA 2013: Personality predispositions moderate soldiers' well-being before and after operational deployment.

Authorship was invited about "National resilience in multinational communities" for the edited book of Enhancing Coping with Crisis and Terrorism (NATO Advanced Research Workshop)

Final Report for NATO RTG203 (Mental Health Training) was completed and presented to NATO HFM Board

- *uurimisgrupi kuni 5 olulisemat publikatsiooni aruandeaastal*

Adler, A. B.; Delahaij, R.; Bailey, S. M.; Van den Berge, C.; Parmak, M.; van Tussenbroek, B.; Puente, J. M.; Landratova, S.; Kral, P.; Kreim, G.; Rietdijk, D.; McGurk, D.; Castro, C. A. (2013). NATO Survey of Mental Health Training in Army Recruits. *Military Medicine*, 178, 760 - 766.

Parmak, M.; Mylle, J.; Euwema, M. (2013). Sensation seeking and perceived need for structure moderate soldiers' well-being before and after operational deployment. *Military Behavioral Health*, online

Parmak, M.; Mylle, J. J. C.; Euwema, M. C. (2013). Personality and the Perception of Situation Structure in a Military Environment: Seeking Sensation versus Structure as a Soldier. *Journal of Applied Social Psychology*, 43, 1040 - 1049.

2. Inseneerihariduse uurimisgrupp; Engineering Education, Tiia Rüütmann

1) Conceptual framework for increasing society's commitment in ICT: approaches in general and higher education for motivating ICT-related career choices and improving competences for applying and developing ICT, Raivo Sell.

- *teadustöö kirjeldus (inglise keeles)*

The general aim of the project is to assess the approach and implemented solutions for the development of essential competences in the field of ICT and for motivation of the career planning in the field. According to the results of the research, mini-experiments and meta-analysis of the relevant scientific literature a conception of the action plan will be developed for the assurance of the sustainability of the field of ICT at general schools and universities. The following groups will be observed in the research - pupils of general schools, university students of ICT specialities (in comparison with other specialities) and students who have discontinued their studies. The research will be carried out in cooperation with University of Tartu, Tallinn University of Technology and the Estonian Information Technology College. As the representatives of enterprisers, Association of Information Technology and Telecommunications is roped in along with foreign scientific consulting partners.

- *aruandeaastal saavutatud tähtsamad teadustulemused (inglise keeles)*

Sets of questionnaires for the survey and research of first year students have been compiled. Research in two stages of students at Tallinn University of Technology, University of Tartu and IT College has been carried out. The results are being analysed and scientific articles based on the results of the research are in progress.

2) Human Resource implementation plan priority "Development of human resources for Research & Development" measure "Science policy and higher education quality development" based on third level education quality development program PRIMUS (1.2.0101.08-0002) "Video Collection of Sample Lectures for Faculty Members, Doctoral Students and Students", Tiia Rüütmann

- *teadustöö kirjeldus (inglise keeles)*

In the framework of the subproject „Video Collection of Sample Lectures for Faculty Members, Doctoral Students and Students“ a collection of videos are prepared in applicable virtual environments for faculty staff, doctoral students and students of different universities and institutions of applied higher education. In cooperation with committed faculty staff and students, coherent, catching and short videos of sample lectures are prepared, including innovative methods of teaching, learning and feedback. Accessibility of the video samples in different virtual environments assures user friendliness and the wide range of users. The video collection is an excellent educational material for the faculty members who complete their continuing education according to individual programme and for the mentors.

- *aruandeaastal saavutatud tähtsamad teadustulemused (inglise keeles)*

Eight samples video lectures have been compiled. The presentation of lectures was the final seminar on December 18, 2013. All the sample lectures are available for the university staff and for the staff of all the partner universities on the webpage of Tallinn University of Technology http://www.ttu.ee/tugistruktuur/haridustehnoloogiakeskus/valminud-tood-2/mikronaidistunnid-2

3) The Eduko Development Programme for Education Sciences and Teacher Training, Tiia Rüütmann

- *teadustöö kirjeldus (inglise keeles)*

Curriculum development for initial and continuing teacher education. Research on evaluation of the quality of teacher education. Development and design of the pedagogical teaching practice. Development of methodology for teaching STEM (Science, Technology, Engineering, Mathematics).

- *aruandeaastal saavutatud tähtsamad teadustulemused (inglise keeles)*

In cooperation with Tallinn University the principles of the joint curriculum for Technical teacher education has been designed. An additional specialisation module for technical teacher education for students of Tallinn University of technology has been designed. Elective module of STEM subjects for Gymnasium students has been designed. Learner-centered guided in-service programme for technical teacher education has been designed and implemented. A module of Supervision of STEM research at gymnasiums has been designed along with the subject syllabi for gymnasium teacher training in the basis of Robotics. A model of a flexible teacher education programme for general school teachers and university staff has been designed.

- *uurimisgrupi kuni 5 olulisemat publikatsiooni aruandeaastal*

Rüütmann, T.; Kipper, H. (2013). Rethinking Effective Teaching and Learning for the Design of Efficient Curriculum for Technical Teachers. International Journal of Engineering Pedagogy, 3(1), 44 - 51.

Mironova, O.; Rüütmann, T.; Amitan, I.; Vilipõld, J.; Saar, M. (2013). Computer Science E-Courses for Students with Different Learning Styles. *In: Annals of Computer Science and Information Systems: Federated Conference on Computer Science and Information Systems, September 8–11, 2013. Kraków, Poland.* IEEE, 2013, 735 - 738.

Rüütmann, T.; Kipper, H. (2013). The Design and Implementation of Learner-Centered Guided In-Service Programme for Technical Teacher Education. *In: Proceedings of 42. IGIP International Conference on Engineering Pedagogy/16.International Conference on Interactive Collaborative Learning (ICL): 42. IGIP International Conference on Engineering Pedagogy/16.International Conference on Interactive Collaborative Learning "The Global Challenges in Engineering education", September 25-27, 2013, Kazan, Russia. (Toim.) M. Auer.* Kazan National Research Technological University, Kazan, Russia: IEEE, 2013, 224 - 229.

Kipper, H.; Rüütmann, T. (2013). Teaching for Understanding in Engineering Education. International Journal of Engineering Pedagogy, 3, 55 - 63.

Sell, Raivo; Rüütmann, Tiia; Seiler, Sven. (2013). Inductive Principles in Engineering Pedagogy on the Example of Remote Labs. *In: Publications of 2 nd Experiment@ International Conference (exp.at'13): 2 nd Experiment@ International Conference (exp.at'13), Online Experimentation, University of Coimbra, Portugal. (Toim.) Alberto Cardoso.* Coimbra, Portugal: IEEE Publishing, 2013, 68 - 71.

4) E-õpe: digitaalsete õppevahendite uurimis ja arendusgrupp, E-learning: Digital Teaching Tools, Mare Teichmann

- *teadustöö kirjeldus (inglise keeles)*

Especially in higher education, there is an increasing tendency towards employing E-learning - an explosive rate of growth, now about 25 per cent a year, has made E-learning one of the most popular and widely used learning methods in universities worldwide. n the other hand, too often the focus has been purely on technology and not enough on variation of didactic methods in whole course combined with E-learning. It is a common understanding that the advantages of E-learning include flexibility and greater adaptability to the learner's needs. E- learning makes available multitude choices for student to find the personal and most effective style of learning. It is important for student to be aware of his learning style, know what his strengths and weaknesses are and are provided a variety of didactic methods to choose the most suitable ones; and the E-application can support the process. On the other hand, the most often listed critical disadvantage of E-learning is the lack of human interaction, as the lecturer is cut out from the teaching process.

Many researchers are in position that the university teaching staff has to dedicate more time to the communication possesses both when the communication is among the academics and when it refers to the communication with students. New technologies are opening different ways for courses, seminars, discussion forums and other approaches to learning to be delivered online with innovative ways to communicate with lecturer and other students.

We have dozen years of experience with digital teaching tools. In study we examine an integrated contact and E-learning course in the field of human factors for engineering students. We discuss the findings of research on student feedback from the Human Factors Engineering course with its didactics and proportion of E-learning. The research examined whether or not the employed E-learning and didactic methods were successful in the teaching process.

- *aruandeaastal saavutatud tähtsamad teadustulemused (inglise keeles)*

In our previous studies we failed to find any statistically significant evidence regarding the difference between the two types of lectures, i.e. E- lectures (video-based lectures) and classical academic lectures in the classroom. The analysis of the students' feedback suggests that engineering students generally have a highly positive attitude towards integrating contact- and E-learning in various courses. The findings of our previous studies indicate that successful E-learning takes place within a complex integrated system involving various didactical methods of teaching.

Focusing on the common disadvantages of the lecture as a didactic method, no additional negative influence from impersonal interaction with the academic was found in the case of the E-lecture. Moreover, the students claimed that they knew the academic from previous "face-to-face" lectures or from introductory lecture and thus the E-lectures caused no confusion.

Our dozen years of experience with digital teaching tools clearly show that students adapt to video lectures much better if they have an opportunity to actually interact with the lecturer before the E-learning starts, i.e. they can be certain that the lecturer is a real person. For that reason we always have an introductory "face-to-face" lecture in a classroom with the same lecturer that recorded the lectures in the digital teaching tool. The purpose of demonstrations in the classroom is to familiarize the students with various methods used in cognitive psychology. Experiments, simulations, and communication exercises with video feedback have a critical place in students' individual skills training. Case study analysis takes place in the classroom with the help of the most valid situations devised by students themselves. Students get a chance to analyze the human factor component and to find more practical solutions for problems. Discussion meetings in the classroom, small group discussions, and round table or panel meetings are didactic methods that successfully help students learn to use knowledge in a particular field of study. We must point out that a discussion meeting *via* Skype can be just as lively and informative as a discussion meeting in a classroom.

- *uurimisgrupi kuni 5 olulisemat publikatsiooni aruandeaastal*

Teichmann, M.; Ilvest, J. Jr. (2012). Human Factors Engineering: digital teaching tools and paper-free handouts for lecture notes. *Journal of WSEAS Transactions on Advances in Engineering Education*, 9(2), 31 - 41.

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5) Inseneride mittetehniliste kompetentside uuringugrupp, Non-Technical Competences For Engineers, Mare Teichmann

- *uurimisgrupi teadustöö kirjeldus (inglise keeles)*

This study empirically tests a heuristic model of non-technical engineering competences. The results of factor analysis and regression analysis support the model proposing six non-technical competence domains consisting of 19 competences engineers use in their everyday work. Furthermore, the competence domains have a shared component with their neighboring competences. Engineers use

more frequently these non-technical engineering competences that belong to the Personal competence domain (i.e. flexibility, learning, self-management, stress tolerance competencies), and to the Interpersonal competence domain (relationships/cooperation, communication, negotiations/conflict management), also personal and professional ethics competencies and innovation and creativity competencies. The findings indicate that the male engineers with the long professional work experience use the Innovation and entrepreneurship competences, and the Leadership, management, and administrative competences more frequently while the female engineers apply more often the Professional ethics competences, the Personal competences, and the Interpersonal competences. Development of these non-technical engineering competencies is highly recommended for the competence-based engineering education in the universities.

- *uurimisgrupi aruandeaastal saadud tähtsamad teadustulemused (inglise keeles)*

There are six domains of engineering NTC; each domain, in turn, is divisible into several competences and consists of various competencies as described in the heuristic model:

1. Professional ethics competence domain (includes three competences: personal ethics, professional ethics, social ethics);
2. Personal competence domain (includes four competences: flexibility, stress tolerance and coping with stress, self-management, learning skills and motivation);
3. Interpersonal competence domain (includes four competences: communication, relationships/cooperation, negotiations and conflict management, influence/manipulation);
4. Innovation and entrepreneurial competence domain (includes two competences: innovativeness, creativity, and entrepreneurship);
5. Leadership, management and administrative competence domain (includes three competences: project management, organization / division management, and team leadership);
6. Law and legal system competence domain (includes three competences: intellectual property law, knowledge of engineers' work legal issues, commercial law).

The empirical analysis supported the heuristic model of non-technical competences for engineers: there are six interrelated domains of NTC the engineers use in their professional work, and these domains are related to each other as predicted. It means that certain competencies from one competences domain are used in parallel domains or are a combination of the competencies from other domains.

Competence gap and employability of alumni: A fluent transition from school to work depends partially on graduates being equipped with the relevant skills and competencies for labour market needs. A relatively high employment rate, employability, and satisfaction with one's work and choice of specialty were found among the TUT graduates indicating successful transition from academia to work among graduates. This study/sample demonstrated that subject-specific competences are seen influential in getting employed but significant competence gap indicates the need to develop those competences further. It was found that general skills were valued most highly in terms of landing a job whereas real work requires little higher level of analysis-synthesis/critical thinking and foreign language skills than alumni had one and half year after graduation. Non-Technical Competences are not homogenous group: recent graduates recognize learning skills as valued in labour market and estimate themselves highly in this regard. Required and real levels of social and self-expression/-presentation skills are similar to subject-specific competences /technical competences: they are highly important in one's everyday work but current level of competence is lower. Leadership skills (also critical thinking skills and general understanding of the world) are seen as less required for present job. Real leadership skill level is lower than required whereas general understanding of the world of TUT alumni is higher in their present job. Interpreting these results in the framework of three competence domains (general, technical, non-technical) the results indicate that in findings a job after graduation the role of general competences was rated as most helpful in average followed by technical competences and NT competences domains (respectively

86%, 80%, and 73% respondents agreed the competences in general, technical and NT domains influenced landing of a job positively).

General compulsory subjects in engineering curricula are aimed to develop students' general worldview, and according to Curricula Statute of TUT should include the following NT subjects: Philosophy; Law; Sustainable development; Economics and entrepreneurship module; Foreign language; Science of risk and safety, and Free electives. Faculties have mostly included NT subject 'Revision of Productive Skills in the Estonian Language' where students' written communication skills are developed. Principles of project management, understanding the processes of product development, and principles of ethical conduct in engineering profession have been taught to engineers over the last 50 years. Comparing the listed subjects with the model of non-technical competences, it appears that compulsory subjects for engineering under- and postgraduate students are focused on developing the Law and legal system, Professional ethics domain, entrepreneurship, communication and project management competences. The development of other Interpersonal competences, Personal competences, Innovation competence, Organization / division management, and Team leadership competences is a decision that each student must make for himself. He can do this by selecting free electives.

- *uurimisgrupi kuni 5 olulisemat publikatsiooni aruandeaastal*

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2.2 Loetelu struktuuriüksuse töötajate rahvusvahelistest tunnustustest.

- *Merle Parmak* – pälvis IMTA[4] Harry Greeri auhinna. mis on väärikaima erialane tunnustus rahvusvahelise militaarpsühholoogide kogukonna poolt. Harry Greeri auhind antakse välja kord aastas inimesele, kes on IMTA juhtkomitee hinnangul silmapaistvalt panustanud militaarpsühholoogia arendusse ja ühingu eesmärkide realiseerimisse.
- *Mare Teichmann* - Full Professorship at University of Silesia, School of Management.

[4] IMTA - International Military Testing Association

2.3 Loetelu struktuuriüksuse töötajatest, kes on välisakadeemiate või muude oluliste T&A- ga seotud välisorganisatsioonide liikmed.

Mare Teichmann

- President of Estonian Work and Organizational Psychology Association (EWOPA) that is Constituent of EAWOP[5];
- Member of EAWOP;
- Estonian (and Baltic) representative in ENOP[6];
- ENOP Web-page Editor (http://www.enop.ee/);
- ENOP Work and Organizational Psychology Development Commission Member, European Curriculum of W/O Psychology: Reference Model and Minimum Standards;
- Member of the International Advisory Board (IAB) for EAWOP Congress 2015;
- Member of Scientific Committee for EAWOP Congress 2015;
- EFPA[7] Standing Committee on Work and Organizational Psychology, EAWOP Executive Committee has selected five members as the founding members for EFPA Standing Committee;
- WHO Quality of Life Centers, chairperson of WHO Estonian Quality Centre.

Tiia Rüütmann

- Member of IEEE, member of IEEE EDUCON Steering Committee;
- Member of IGIP[8] Executive Committee;
- Member of Delta Kappa Gamma – International Society for Key Women Educators.

Mart Murdvee

- Founding member of Union of Estonian Psychologists;
- Member of Estonian Work and Organizational Psychology Association (EWOPA).

Liina Randmann

- EAWOP Liaison of Estonian Work and Organizational Psychology Association (EWOPA), Constituent of EAWOP;
- Member of EAWOP.

Velli Parts

- Member of Estonian Work and Organizational Psychology Association (EWOPA), Constituent of EAWOP;
- Member of EAWOP.

Merle Lõhmus

- Member of Estonian Work and Organizational Psychology Association (EWOPA), Constituent of EAWOP;
- Member of EAWOP.

Taimi Elenurm

[5] EAWOP – European Association of Work and Organizational Psychology
[6] ENOP – European Network of Work and Organizational Psychology Professors
[7] EFPA – European Federation of Psychologists' Associations
[8] IGIP – International Society for Engineering Education and modern engineering pedagogy

- Member of Estonian Work and Organizational Psychology Association (EWOPA), Constituent of EAWOP;
- Member of EAWOP.

Merle Parmak

- Member of Union of Estonian Psychologists.

2.4 Soovi korral esitatakse aruandeaastal saadud T&A-ga seotud tunnustused (va punktis 2.3 toodud tunnustused), ülevaade teaduskorralduslikust tegevusest, teadlasmobiilsusest ning hinnang oma teadustulemustele.

Liina Randmann

- Kaitses EBSis doktoriväitekirja 'Differences in Psychological Contracts in Estonia: The Role of Individual and Contextual Factors'

Mare Teichmann

- Invited Symposium 'Occupational Stress and Quality of Life (QoL)', IAAP[9] 28th Congress of Applied Psychology 2014;
- Akadeemilise tööstressi artikkel 'Academics' occupational stressors' refereeriti:

- *Medical News Today* (http://www.medicalnewstoday.com/releases/270831.php)
- *Medical News Today weekly newsletter* - 8 January 2014.

Merle Parmak

- Korraldab konverentsi: IAMPS[10] 2014: The Power of Multidisciplinary, TTÜ, 16-19 June 2014

Tiia Rüütmann

- Korraldab konverentsi: IGIP-IEEE EDUCON Conference 2015

[9] IAAP - International Association of Applied Psychology
[10] IAMPS - International Applied Military Psychology Symposium