



STUDIJŲ KOKYBĖS VERTINIMO CENTRAS

**VILNIAUS GEDIMINO TECHNIKOS UNIVERSITETO
ELEKTROS ENERGETIKOS SISTEMŲ INŽINERIJOS
PROGRAMOS (621H62002)
VERTINIMO IŠVADOS**

**EVALUATION REPORT
OF *ELECTRICAL ENERGETICS SYSTEMS*
ENGINEERING (621H62002)
STUDY PROGRAMME
at VILNIUS GEDIMINAS TECHNICAL UNIVERSITY**

Grupės vadovas:
Team leader: Anne-Marie Jolly Desodt

Grupės nariai:
Team members: Marios Kasinopoulos
Juozas Vaitkus
Artūras Klementavičius
Tautvydas Jančis

Išvados parengtos anglų kalba
Report language - English

Vilnius
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DUOMENYS APIE ĮVERTINTĄ PROGRAMĄ

Studijų programos pavadinimas	Elektros energetikos sistemų inžinerija
Valstybinis kodas	621H62002
Studijų sritis	Technologijos mokslai
Studijų kryptis	Elektronikos ir elektros inžinerija
Studijų programos rūšis	Universitetinės studijos
Studijų pakopa	Antroji
Studijų forma (trukmė metais)	Nuolatinė (2)
Studijų programos apimtis kreditais	120 ECTS
Suteikiamas laipsnis ir (ar) profesinė kvalifikacija	Elektros inžinerijos magistras
Studijų programos įregistravimo data	2009-08-31, Nr. 1-73

INFORMATION ON EVALUATED STUDY PROGRAMME

Title of the study programme	Electrical Energetics Systems Engineering
State code	621H62002
Study area	Technology science
Study field	Electronics and electrical engineering
Kind of the study programme	University studies
Study Cycle	Second
Study mode (length in years)	Full-time (2)
Volume of the study programme in credits	120 ECTS
Degree and (or) professional qualifications awarded	Master of Electrical Engineering
Date of registration of the study	2009-08-31, Nr. 1-73

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The Centre for Quality Assessment in Higher Education

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I. INTRODUCTION

This Evaluation report is based on the Self-Evaluation Report (SER) prepared by Prof. Dr. J. Novickij and his team. The program “Electrical Energetics System Engineering“ is a programme of second cycle of university studies; the students study full-time during 2 years. The granted degree is a Master of Electrical Engineering.

This programme has been initially developed by cooperation of specialists from Westfälische Hochschule designed later in WH, Gelsenkirchen (Germany). It includes now modern electrical engineering specialization.

The programme concerns the electric systems field and, from the beginning intends to match the priority scientific research and the experimental development fields of Lithuania concerning the electrical energetic field problems:

- High electric and magnetic technologies
- High power electronics technologies

But also interdisciplinary subjects such as: Thermal engineering and mechanics

It has been developed after some years and now, teachings concern also:

- Photovoltaic and wind energy field
- Power electronics
- Smart electricity networks

The lecturers and researchers of Centre of Physical Science and Technology, Perspective Technology Applied Institute (Vilnius) are also very involved in the course; this Centre has a great importance for the curriculum and gave it high scientific level, allowing students to make applied research at a good level.

In 2008, VGTU has been evaluated by Association of European Universities and from this evaluation results, since 2011 the actual organization of the University. The responsibility of this programme is in Faculty of Electronics in VGTU.

The programme has already been positively evaluated. Following this evaluation, laboratory works, projects have been introduced, special attention to the Electrical Energetics subjects given and two specializations created: Technologies of Electrical Energetics and Modern Electrical Power Engineering, each specialization is worth 27 credits.

This programme is a bit confidential (12 Lithuanian students only) in a field (energy systems) where needs of employers are huge. The employers are satisfied with the graduates and they would be happy with more of them. For the moment the number of Lithuanian students is limited by the number of the baskets afforded. But the programme attracts numerous foreign students and also students from WH in double diploma.

The remote study of the SER was conducted out in September and October 2012. The work of the team of evaluation was not easy because

- there is a strong lack or strength and weaknesses analysis for each criteria of evaluation in the SAR,

- the expert did not receive, before coming in the University, the detailed description of subjects because they were not available in English, and after asking them during the visit, they discovered that they were not sufficiently detailed for an international evaluation, on the web site in English

The on-site evaluation was performed by the entire evaluation team on October 19th according to the following schedule:

- 9-9h 45 Meeting with administrative staff

- 9h 45-10h30 Meeting with staff responsible for preparation of SER

- 10h45-11h45 Meeting with teaching staff

- 11h45-12h30 Meeting with students

- 13h30-14h15 Observation of various support services (studios, teaching spaces, workshops, library, computer services...)

- 14h15-15h Familiarization with student's final works, examination material

- 15h-15h45 Meeting with graduates and employers, social partners

- 16h15-16h30 Introduction of general remarks of the visit.

The following evaluation report represents the unanimous opinion of the entire team.

II. PROGRAMME ANALYSIS

1. Programme aims and learning outcomes

The main intention of the programme is to provide graduates to be able to design and make research in the fields of modern power systems concerning particularly generation of energy, as opposed for example as was told by the staff during the visit, to the graduates of Kaunas University of Technology in this field, whose aim is much more to operate them. Best students can also continue in the doctoral program of the University.

The programme aims and learning outcomes presented in the SAR are not very clear; for example the same programme aim includes the skills related to creativity and to improvement of professional competences, those do not require the same learning outcomes, so the link between program aims and learning outcome is more complex than it should be. Learning outcomes need also to be reformulated in a more precise way to be understandable, especially by stakeholders and students.

The programme aims and learning outcomes are based on the academic requirements, and the needs of the labour market. The programme aims described in SER seem consistent with the type and level of studies and the level of qualifications offered but the learning outcomes are too vague.

The name of the programme is not coherent because it does not match the energy systems: power system technologies are much more concerned than power systems. The word “modern” is very often used to describe the programme or its contents. The graduates should be more concerned by the future and by innovation, modernity is only something which shows an equation with the present as opposed to old-fashioned things.

Both programme aims and learning outcomes are published on the VGTU website, the programs are also available in English. A huge work has been done to renovate this programme and to be ready for arrival of students, so the department of information on programmes has not completely fulfilled his job yet: all the details of the subjects are not completely available for instance.

The review of learning outcomes is monitored by the study Committee of Faculty including social partners: employer’s representative and president of student’s agency.

2. Curriculum design

The curriculum design meets legal requirement. As there are no equalizing courses, or appearing as so in the program or in the students declarations, for the bachelor students coming from different specialties, some teachings include a great amount of concepts of bachelor level, for example in thermal engineering, there is about 1/3 of the program which is at the level of bachelor.. Moreover, the abilities described in the subjects of the syllabus are sometimes copy-pasted from one subject to another and not enough specific to the subjects. If study time was earned by suppressing teachings of bachelor level, this time could be afforded to go deeper in the teachings that are around the core of the program and increase the systematic approach: automation, thermodynamics, and measurements subjects should have study time increased for example: it seems they have yet been increased since the redaction of the SER .

The teachers have informal discussion between them each week to improve the programme. There is a steering committee of the programme but it is not known at the level of the faculty. Each month the stake holders speak with professor J. Novickij about their requirements concerning the programme and internships.

The duration of the programme is 3200 h; overall duration of the contact teaching is 792h. Specializations start from the third semester, each specialization worth 27 credits excluding final work. The final thesis is prepared since the beginning of first year which allows a serious reflexion of the students, and the students choose their topics at this moment. Attempts to new pedagogies are successfully realized for example the use of PBL (Problem Learning) for example in Fundamentals of Research and Innovation, this subject concerns all faculty students, but, concerning the subjects of the programme itself, the size of the group allows direct interference between teachers and students, teachers also write textbooks. Life Cycle Analysis, ecodesign directives are spoken about during some of the subjects (energetics, applied research), so the students are able to discuss on sustainable development points.

There are few practical hours, but it is considered as enough by the graduates and it seems the same also by the employers. The fact that students can use resources of the companies or institutes (semiconductor, windmills...) to complete the practice made in the college is really necessary and appreciated by students.

During on-site visit and looking at the master theses, we observed that their titles mostly concern electrical systems, this does not match with the larger ambition of the programme.

Employers think there is still a lack of people that could design renewable energy systems nowadays, and that there is a lack of engineers in smart grids and intelligent electrical systems, the programme could emphasize more on these domains.

3. Staff

The staff meets legal requirements and their qualification in convenient. Most of the teachers (46%) are in the age group 51-60 in 2011-2012, this shows a strong need to attract new teachers, young doctors that made their doctoral thesis in the new fields of teaching of the program: 5 new lecturers were ready to join the program in June 2012.

As there is a small group of students, teachers are nearly as numerous as students; this generates a good collaboration between teachers, students and administration.

Except for research international conferences, the international relations for most of the staff concentrate mainly on 2 destinations WH and Institute of Saint Louis, which is part of the European Pulsed Power Laboratories Network and so, concern a restricted number of teachers (those who make research in this field). The international relations for teachers in this network are at very good level but it concerns only a part of the teachers. These teachers make lectures in WH with which an agreement of double diploma has been concluded between WH and VGTU. The programme should develop relations with the foreign universities having doctoral programmes for the benefit of students and teachers, these relations should also concern all the teachers. The Erasmus agreements don't sufficiently concern the teachers.

Teachers teach in English language as soon as a foreign student is present. Most of the teachers of the programme make scientific and applied research at high level which generates high number of publications and patterns, so, they can encourage students to innovative projects. Students encouraged by their teachers participate in young scientists conferences. So it gives students the level and desire to continue their studies in doctoral studies.

The minimum number of publications required by university for each teacher is one each year. The teachers have facilities to go and present their research abroad but also to attend courses (some attended courses on learning outcomes, on problem learning, on buildings and energy). Some teachers have contracts with industry especially with France on high magnetic pulse or in Lithuania in high frequencies field.

4. Facilities and learning resources

Specialized equipment is good. The university has good funding from Lithuanian government and European programmes, the academics have participated in the project for the EU structural funds: “The reorganization and renewal of the master’s and doctoral study programmes of Electronic and Computer Engineering in VGTU” University also got devices from research projects. As we saw during on-site visit, High electric and magnetic technologies devices are of very high level, but in the fields of electric systems, equipment should be improved, for example concerning new sources of energy.

The college use also the devices of some institutional partners such as Lithuanian microclimate Laboratory and of industrial partners (for example concerning teaching on photovoltaic panels), this is a good and encouraging action.

The students use more direct contact with teachers than textbook or Moodle. Teachers write textbooks: these lectures notes are numerous; 2 or 3 years after their design, when they are accepted as publication, they are published. However, there is a lack of software licenses in the department of Electronics; in this field very specific and expensive software for simulation for instance, are needed. The number of students do not match with the number of licenses needed in such a technical programme, it is a pity because employers need at this level of study, students used to work on these tools.

A software scheduling system for the contact hours would be necessary at the level of university to avoid the repetition of the same teachings for small numbers of students in different programmes. During the visit teachers told us that they had to repeat several times the same subject for different small groups of students, it is a lost of time and money.

5. Study process and student assessment

The rules of assessment seems clear to the students, in case of problem they can easily discuss with the teacher or administration. All of them have got a basket (studies are supported by the government) which explains the restricted number of students.

The new programme is rather wide, it is more interesting than the previous one and so attracts students from different technical bachelors. For these bachelors, much new knowledge has to be acquired, this explains the drop out that in some years reach very high value for example 11 dropped out of 12 in 2009 and 6 dropped out of 11 in 2010.

There is a problem for the admission of students entering from bachelor degree because admission is driven by the university and not by the faculty. So the prerequisite are very large that makes the repetitions of bachelor level subjects mandatory during the first year

of the master (about 20% according to the students) and prevents from going deeper in the master subjects.

The position about plagiarism is also not enough clearly expressed by the faculty. There is a good international mobility with incoming and out coming students and a double diploma with WH. The students regret that, due to law, the double diploma agreement prevents those doing a PhD after the master degree to begin this PhD just after master graduation. This is due to the difference in time, when master degree is presented for the student in the two higher education institutions.

There are friendly relationships among the students, and foreign students help Lithuanian ones to improve their level in English language. The students would like that students be 50% foreign, 50% Lithuanian. Some of them prefer to be with foreign students than to go abroad!

The schedules of contact hours let the student to be able to have work while studying in the master. Faculty arranges schedules so that it is possible, because many students work in parallel with their studies. The employers seem happy with this arrangement. The employers encountered are satisfied of the graduates. There is a high level of employment for those who did not decide to continue in doctoral studies. The demand for specialists in the field, in 2012, in the 6 major Lithuanian innovative companies was greater than the number of graduates in four years.

The students would like that the University receive money to continue to send them in study trips abroad, because it's important for a global vision of the field of studies. Amongst alumni there are women with good job positions, however, between the students there are not enough girls as compared as the attempts made everywhere in Europe to overcome lack of women in sciences and technologies.

Remarks of the student expert of the team:

International mobility of out coming and incoming students is good, but the main collaboration is with Westfälische Hochschule, University of Applied Sciences and it is not the same level as the university. These Universities in Germany are more practical oriented and have no possibilities of doctoral studies.

During the visit it was told us that it would be great if this study program would have more or less the same number of foreign students and local Lithuanians. Because teachers can speak English, so there would be no problem and Lithuanian students would have an occasion to talk in English and improve their speaking skills.

It was mentioned that about 20% of some subjects' content was the same as in Bachelor studies. Repetition is necessary especially for students from other faculties and universities, but Master studies should be more oriented to individual and scientific work, so this repetition should be just a short introduction to the main topics which are useful and studied in Bachelor's studies.

Students are satisfied with teachers and relations with them, but final theses do not correspond to the name of study program of *Electrical Energetics Systems Engineering*. Majority of them are about other topics which are not related to distribution and transmission grids, power plants and other similar topics. Moreover, all of the students are not thinking to study in doctoral degree so, to orient more final thesis topics to the enterprise needs, would be more useful for them.

Remark was given about the study trip organized in the previous years for students to the enterprises all over Europe. They are not so intensively organized nowadays and after these trips which were combined with introduction lectures about specific topics, students had a better understanding about the industry and its situation in Europe and about the kind specialists needed worldwide: their motivation to study used to be increased, so it is important to go on with these trips.

6. Programme management

During the visit, we discovered that the study committee of the programme was informally formed by the administration of the faculty. The study programme committee works also through telephonic calls, which gives it more flexibility. So, its work lacks efficiency, and it is difficult to have a strong involvement of stakeholders in the design of the programme because it is always the same employers that are very close to the University that are questioned.

Each year, there are many oral discussions of teachers with students that ask for changes in the contents of subjects because each year the origin of students vary. Some years, some students can also ask for more specific knowledge, that is then given to them. Also, distance learning consultations are sometimes given for improvement of knowledge.

Questionnaires for the evaluation of teachings by students exist and are proposed each semester, they are optional and anonymous. But study of the motivations of students should be done: our discussion with students of the panel showed us that they come in the programme because of the opportunities of carrier, salaries, modern aspect of the course, but it would be important to analyze this at a more global level for the future of the programme.

The recommendations of the previous evaluation have been taken into account, for example the creation of the new specialization, except the one which ask the teachers and the programme to open themselves to European Universities

III. RECOMMENDATIONS

1. Encourage all the teachers even if they do not belong to EPPLN to have relations or partnerships with foreign universities that have doctoral programmes
2. Have a strong reflexion on aims and learning outcome formulation
3. Define the syllabus and the abilities related to it in a precise way
4. Have a reflexion on the title of the program
5. Create equalizing courses or show clearly the optional choice of teaching according the source of bachelor for students that do not come from electric studies
6. Make the words describing learning outcomes more accurate and understandable to young people
7. Increase the subjects in relation to energetic systems
8. Make the study committee more formal and known by the staff of University
9. Try to attract more female students, at European level in these fields, parity has much improved and international companies wish to have teams of both gender to be more efficient.

IV. SUMMARY

The study programme in electrical energetics systems engineering is a significant contribution to the growing need for engineers in the domain of energy in Lithuania and abroad. Employers - Employers are satisfied of the graduates and point out to the lack of graduates of this programme, where the number of Lithuanian students admitted is limited by the number of baskets. As the program is in strong link with the Centre of Physical Science and technology, specialized equipment is very good and students have the possibility to work on top level devices, they are encouraged to work on innovative projects.

Teachers are in link for sake of research with excellence networks and obtain good funding from Lithuanian government and European programmes, they also participate to European project linked with pedagogy. The study program teachers make scientific and applied research at a high level. Some of them have a high number of publications and also of patterns, this last point is very important because it shows to the student the importance of this kind of activity.

There is a good collaboration between teachers, students and administration, making adaptation of the program to the students very easy. The teachings are in English language, this gives the possibility to attract foreign students not only from Europe. There is a good international mobility of incoming and out coming students, and a double diploma with Germany is very active.

The faculty has to progress on the formulation of the programme of the studies: learning outcomes are not clear and not written in appropriate way with respect to the aims of the program, they are not understandable by a potential student from Lithuania or abroad; when available, content of subjects is not sufficiently detailed, making difficult to understand the real level of teaching. The title of the program does not correspond to the study program content because it does not match to energy systems: reflexion could help to find a title conform to law and to reality.

All the teachers in study programme do not have sufficient relations with universities having doctoral degrees, this is very important not only for research but also for students exchange. It is necessary to involve all the teachers in these relations not only those who work in the fields of high electric and magnetic technologies or high power electronics technologies. It is necessary to recruit young teachers having doctoral degree to develop the subjects related to the new specialization and renew basic ones.

The absence or non presentation as optional of equalizing courses for student coming from non electric specialties leads to too many repetitions of the bachelor program, which makes the contact hours less efficient to deepen new subjects. During the visit, we discovered that, though this point was treated in the SAR, there was not clearly expressed position about plagiarism. The faculty should also find a solution to attract more female students to stay in the standards of European Union concerning gender.

Management of the program could improve because the work of study committee is not effective and there is a lack of collaboration with faculty level. Because this management is quite informal, there is insufficient involvement of large number of employers in the design of the program

V. GENERAL ASSESSMENT

The study programme *Electrical Energetics Systems Engineering* (state code – 621H62002) at Vilnius Gediminas Technical University is given **positive** evaluation.

Study programme assessment in points by evaluation areas.

No.	Evaluation Area	Evaluation Area in Points*
1.	Programme aims and learning outcomes	2
2.	Curriculum design	3
3.	Staff	3
4.	Material resources	3
5.	Study process and assessment (student admission, study process student support, achievement assessment)	3
6.	Programme management (programme administration, internal quality assurance)	3
	Total:	17

*1 (unsatisfactory) - there are essential shortcomings that must be eliminated;

2 (satisfactory) - meets the established minimum requirements, needs improvement;

3 (good) - the field develops systematically, has distinctive features;

4 (very good) - the field is exceptionally good.

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Santraukos vertimas iš anglų kalbos

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V. APIBENDRINAMASIS ĮVERTINIMAS

Vilniaus Gedimino technikos universiteto studijų programa *Elektros energetikos sistemų inžinerija* (valstybinis kodas – 621H62002) vertinama **teigiamai**.

Eil. Nr.	Vertinimo sritis	Srities įvertinimas, balais*
1.	Programos tikslai ir numatomi studijų rezultatai	2
2.	Programos sandara	3
3.	Personalas	3
4.	Materialieji ištekliai	3
5.	Studijų eiga ir jos vertinimas	3
6.	Programos vadyba	3
	Iš viso:	17

* 1 - Nepatenkinamai (yra esminių trūkumų, kuriuos būtina pašalinti)

2 - Patenkinamai (tenkina minimalius reikalavimus, reikia tobulinti)

3 - Gerai (sistemiškai plėtojama sritis, turi savitų bruožų)

4 - Labai gerai (sritis yra išskirtinė)

<...>

IV. SANTRAUKA

Elektros energetikos sistemų inžinerijos studijų programa labai atsižvelgiama į didėjančią inžinierių poreikį energijos srityje Lietuvoje ir užsienyje. Darbuotojai absolventais patenkinti ir nurodo, kad šios programos, kurią studijuoti priimamų Lietuvos studentų skaičius ribojamas atsižvelgiant į krepšelių skaičių, absolventų trūksta. Programa labai smarkiai susieta su Fizinių ir technologijos mokslų centru, todėl specializuota įranga yra labai gera, studentai turi galimybę dirbti su šiuolaikiškais prietaisais ir yra skatinami dalyvauti įgyvendinant inovatyvius projektus.

Dėstytojai tyrimų tikslais palaiko ryšius su kompetentingais tinklais, gauna gerą finansavimą iš Lietuvos vyriausybės ir pagal Europos programas, taip pat dalyvauja su pedagogika susijusiame Europos projekte. Studijų programos dėstytojai vykdo aukšto lygio mokslinius ir taikomuosius tyrimus. Kai kurie iš jų yra paskelbę daug publikacijų ir modelių; pastarasis aspektas labai svarbus, nes studentams rodoma šios rūšies veiklos svarba.

Dėstytojai, studentai ir administracijos darbuotojai gerai bendradarbiauja, todėl programą labai paprasta pritaikyti studentams. Dėstoma anglų kalba, todėl galima pritraukti studentų ne tik iš Europos. Pastebimas aktyvus tarptautinis judumas: studentai atvyksta ir išvyksta, labai aktyviai dalyvaujama dvigubo diplomo su Vokietija programoje.

Fakultetas turėtų geriau suformuluoti studijų programą: numatomi studijų rezultatai neaiškūs ir, atsižvelgiant į programos tikslus, aprašyti netinkamai, jie nesuprantami potencialiam Lietuvos arba užsienio studentui; dalyko turinys, jei aprašytas, nėra pakankamai išsamus, todėl sunku suprasti tikrąjį mokymo lygį. Programos pavadinimas neatitinka studijų programos turinio, nes nėra suderintas su energijos sistemomis: būtų galima apsvarstyti ir rasti teisės aktus ir tikrovę atitinkantį pavadinimą.

Ne visi studijų programos dėstytojai palaiko pakankamus ryšius su universitetais, kuriuose galima įgyti doktorantūros laipsnį; šie ryšiai labai svarbūs ne tik tyrimams, bet ir studentų mainams. Į šiuos ryšius būtina įtraukti visus dėstytojus: ne tik tuos, kurie dirba aukštos įtampos elektros įrenginių ir magnetinių technologijų arba aukštos įtampos elektronikos technologijų srityse. Reikia jaunų daktaro laipsnį turinčių dėstytojų, kurie galėtų parengti su nauja specializacija susijusius dalykus ir atnaujintų pagrindinius dalykus.

Kadangi ne elektros specialybės baigusiems studentams skirtų išlyginamųjų kursų nėra arba jie nepristatyti kaip pasirenkamieji, per daug kartojama bakalauro programa, todėl paskaitų metu nelabai veiksmingai gilinami nauji dalykai. Vizito metu nustatėme, kad nors plagiato klausimas į savianalizės suvestinę įtrauktas, aiški pozicija neišreikšta. Fakultetas taip pat turėtų apsvarstyti, kaip pritraukti daugiau studentų, kad būtų galima laikytis Europos Sąjungos lyčių standartų.

Programos vadybą būtų galima gerinti, nes studijų komiteto veikla nėra veiksminga ir trūksta bendradarbiavimo fakulteto lygmeniu. Ši vadyba palyginti neformali, todėl daugelis darbdavių nepakankamai dalyvauja rengiant programą.

III. REKOMENDACIJOS

10. Skatinti visus dėstytojus, net jei jie nėra tinklo EPPLN nariai, užmegzti ryšius arba partnerystes su doktorantūros programoms įgyvendinančiais užsienio universitetais.
11. Labai gerai apsvarstyti tikslų ir numatomų studijų rezultatų formuluotes.
12. Tiksliai apibrėžti studijų planą ir su juo susijusius gebėjimus.
13. Apsvarstyti programos pavadinimą.
14. Parengti išlyginamuosius kursus arba aiškiai nurodyti galimybę ne elektros studijas baigusiems studentams pasirinkti studijas atsižvelgiant į bakalauro žinias.
15. Numatomus studijų rezultatus aprašyti tiksliau ir aiškiau jaunimui.
16. Didinti su energetikos sistemomis susijusių studijuojamų dalykų skaičių.
17. Didinti studijų komiteto oficialumą ir universiteto darbuotojų informuotumą apie jį.
18. Stengtis pritraukti daugiau studenčių; Europos lygmeniu šiose srityse lygybė labai pagerėjo ir tarptautinės įmonės, norėdamos veikti veiksmingiau, pageidauja abiejų lyčių darbuotojų.

<...>
