PEESA III
Personalized Engineering Education in South Africa

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PEESA III
Gender Equality Issues among PEESA III partner universities

USZ team (alphabetically)
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UNIWERSYTET SZCZECIŃSKI
WYDZIAŁ EKONOMII FINANSÓW I ZARZĄDZANIA

Agenda 1/2

I. Gender Equality Plan (GEP) – background, skeleton of activities (Małgorzata Zakrzewska)

II. Introduction to gender equality (Małgorzata Zakrzewska)

II.1. Analyzing the current status of gender equality activities at SA partners institutions

III. Promotion of gender equality (Małgorzata Zakrzewska)

III.1. Promotion of gender equality in higher education among PEESA III members

III.1.1. Analysis of the female participation during PEESA III Projects meetings (11.2017-10.2019)

Agenda 2/2

III.2. Promotion of gender equality in higher education in South Africa among staff members (Barbara Czerniachowicz)

III.2.1 Gender equality questionnaire for academic staff at PEESA III SA partner universities

III.3. Promotion of gender equality in engineering education in South Africa among students (Jacek Batóg)

III.3.1. Gender equality questionnaire dedicated to students from PEESA III SA partner universities – early results

I. GEP background

During the implementation of PEESA and PEESA II one of the greatest challenges In South Africa is facing at the moment is the acute shortage of engineers.

Women make up approximately 50% of the population in South Africa, yet very few are involved in the engineering profession, less that 10% in some branches of engineering.

The current participation rate in higher education in South Africa is less that 18% of those in the age group 18 to 24.

Currently universities in South Africa are oversubscribed and are not in a position to increase their enrolment1. Therefore there is a need to analysis and evaluate tools to promote geneder issues in capacity building in South Africa.

Source: Part E. Project characteristic and relevance, PEESA III Detailed Project Description, p. 40

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I. GEP skeleton of activites

Objective: To promote gender equality in engineering education in South Africa

A. Introduction to gender equality

B. Promotion of gender equality

B. I. Promotion of gender equality in higher education

1. Promotion of gender equality in higher education among PEESA III members
2. Promotion of gender equality in higher education in South Africa among staff members

B. II. Promotion of gender equality in engineering education in South Africa

1. Promotion of gender equality in engineering education in South Africa among students
2. Promotion of gender equality in engineering education in South Africa among students of PEESA I and PEESA II developed master programmes

C. Facilitation of gender equality

1. Comparative analysis of results of gender equality questionnaires
2. Final recommendations on promotion gender equality in engineering education in South Africa based on analysis of the PEESA III SA partner universities

II. Introduction to gender equality

II.1. Analyzing the current status of gender equality activities at SA partners institutions

based on the presentations made by PEESA III SA representatives that is:

- Faculty of Engineering and the Built Environment and Office of the Dean at the Tshwane University of Technology (TUT)
- Faculty of Engineering at the Cape Peninsula University of Technology (CPUT)
- Faculty of Engineering and the Built Environment at the Durban University of Technology (DUT)

*VUT - oral presentations; missing data has been supplemented with information and materials obtained from the VUT official website: https://www.vut.ac.za/

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II.1. Analysing…

In received materials, following aspects have been analysed:

1. Vision, mission and values concerning gender equality at PEESA III SA universities (table 1)

2. Faculty's strategy related to Women in Engineering at PEESA III SA universities (table 2)

3. currents situation on gender equality among employees at PEESA III SA universities (table 3)
4. current situation on gender equality among students at PEESA III SA universities III (table 4)

5. activities dedicated to women at PEESA III SA partners universities III (table 5)

6. potential risk while implementing activities related to gender equality at PEESA III SA universities (table 6).

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II.1. Analysing…

Table 1. Vision, mission and values concerning gender equality at PEESA III SA partners universities

Tshwane University of Technology (TUT)	Cape Peninsula University of Technology (CPUT)	Durban University of Technology (DUT)	Vaal University of Technology (VUT)
Vision, mission and values concerning gender equality			
N	**NOT DIRECT** "sustainable and environmentally conscious"	**NOT DIRECT** "A preferred University for developing leadership in (…) productive citizenship," External engagement that promotes (…) entrepreneurship through collaboration and partnership. "Respect, Recognition, Opportunity (…) Loyalty, Dignity and Trust Transparency, Openness, Honesty (…)	**NOT DIRECT** "To be a university that leads in innovative knowledge (…) **"(…) is** to produce employable graduates who can make an impact in society by: -(…) -Creating a scholarly environment conducive for knowledge creation, learning and innovation; -Developing a Programme Qualification Mix (PQM) that meets the needs of society in Africa and beyond. "(…)Mutual Respect Collegiality Honesty and Integrity Tolerance Diversity (…)

Source: own based on received materials

Table 2. Faculty's strategy related to Women in Engineering at PEESA III SA partners universities

Tshwane University of Technology (TUT)	Cape Peninsula University of Technology (CPUT)	Durban University of Technology (DUT)	Vaal University of Technology (VUT)
Faculty's strategy related to Women in Engineering			
n/a	**DIRECT** a) Build a database of current female graduates b) identification of suitable candidates for a Women in Engineering academic development programme c) The student recruitment plan includes and is focused on the recruitment of female students. d) development a student recruitment plan aligned to the faculty enrolment targets for 2017 – 2020. d) encourage CPUT engineering female students to participate in the various initiatives offered by NGOs aiming at increasing participation rates of women in engineering e) Through the CPUT Alumni Office, set up	**NOT DIRECT** a) improving the life chances and aspirations of students and helping them to reach their maximum potential; b)contributing to building: -a safe society by addressing poverty reduction, - a learning society through broadening access in traditional and non-traditional forms -a busy society by contributing to building Entrepreneurship - working closely with government and established business and industry.	**NOT DIRECT** a) Create an enabling environment for effective strategic leadership b) Build a Programme Qualification Mix (PQM) and institutional curriculum of excellence c) Enhance financial viability of VUT d) Improve the corporate image of VUT e) Improve student access and success

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II.1. Analysing…

Table 3. Current situation on gender equality among employees at PEESA III SA partners universities

Tshwane University of Technology (TUT)	Cape Peninsula University of Technology (CPUT)	Durban University of Technology (DUT)	Vaal University of Technology (VUT)
currents situation on gender equality among employees/ women enrollment			
Women enrollment 26,4% Department of Chemical, Metallurgical & Materials Engineering 53% Building Science Department 42%	Faculty of Engineering management 37,5%	TBA .	**TBA**

Source: own based on received materials

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II.1. Analysing…

Table 4. current situation on gender equality among students at PEESA III SA partners universities III

Tshwane University of Technology (TUT)	Cape Peninsula University of Technology (CPUT)	Durban University of Technology (DUT)	Vaal University of Technology (VUT)
current situation on gender equality among students/ students' enrollment			
Overall 28% Faculty of Building Science 43% Faculty of Chemical, Metallurgical & Materials Engineering 41% Industrial Engineering 37% Geomatics 36% Architecture 29% Faculty of Electrical Engineering 27%	Overall for Faculty of Engineering Increase of 3% in 10 yrs Department of Chemical Engineering 46% Industrial Engineering 40% Civil Engineering, Electrical Engineering and Mechanical Engineering no significant improvement over the last 10 years.	TBA	TBA

Source: own based on received materials

II.1. Analysing…

Table 5. Activities dedicated to women at PEESA III SA partners universities III

Tshwane University of Technology (TUT)	Cape Peninsula University of Technology (CPUT)	Durban University of Technology (DUT)	Vaal University of Technology (VUT)
Activities dedicate to women			
Funding from merSETA Workshops a) with women from industry b) academic writing workshops for women c) winter school: to improve maths and science d) mentoring Funding support for a) undergraduate female students b) postgraduate students Career awareness in rural areas	Engineering open days (with a specific focus on females) a) mother and daughter days b) female guest speakers c) female guest lecturers d) career guidance Bursaries support Visiting, exhibiting at female only schools Use of mass media a) engineering recruitment videos dedicated to woman d) using TV screens in schools and expos	E-Learning Tutorials for women a) introducing tutorials to more programmes b) e-learning materials, similar to Salkhan philosophy (free on-line education) Cooperation with an university interdisciplinary laboratory - UFC to design engagement programmes among women	TBA

Source: own based on received materials

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II.1. Analysing…

Table 6. Potential risk while implementing activities related to gender equality at PEESA III SA partners universities

Tshwane University of Technology (TUT)	Cape Peninsula University of Technology (CPUT)	Durban University of Technology (DUT)	Vaal University of Technology (VUT)
RISK			
TBA	TBA	TBA	TBA

Source: own based on received materials

III. Promotion of gender equality

III.1. Promotion of gender equality in higher education among PEESA III members

III.1.1. Analysis of the female participation during PEESA III Projects meetings (11.2017-10.2019)

- Meetings:

TUT 2017
CPUT 2018
HSFL 2018
USZ 2018
DUT 2019

- Number of females
- Ratio of females among PEESA III teams
- Ranking for particular University (1st place – 1 point, 2nd place – 2points etc)
- Ranking for particular meeting

Table 7. Female and male participation during PEESA III meetings. Ranking.

MEETING/UNIVERSITY		ASIIN	CPUT	DUT	HSFL	HSW	LBUS	TUT	USZ	VUT	AVERAGE
TUT 2017	Female	x	0	0	0	1	x	0	3	1	16%
	Male	x	4	2	2	3	x	1	1	6	
	Ratio F/M	x	0%	0%	0%	25%	x	0%	75%	14%	
	Ranking	4	4	4	4	2	4	4	1	3	
CPUT 2018	Female	0	2	3	1	1	1	2	3	1	29%
	Male	1	4	4	5	2	5	4	1	6	
	Ratio F/M	0%	33%	43%	17%	33%	17%	33%	75%	14%	
	Ranking	6	0	2	4	3	4	3	1	5	
HSFL 2018	Female	1	2	3	2	1	0	0	3	1	31%
	Male	1	6	6	2	2	3	0	1	7	
	Ratio F/M	50%	25%	33%	50%	33%	0%	0%	75%	13%	
	Ranking	2	4	3	2	3	6	6	1	5	
USZ 2018	Female	x	2	3	3	1	1	2	3	0	34%
	Male	x	6	6	2	3	4	4	1	7	
	Ratio F/M	x	25%	33%	60%	25%	20%	33%	75%	0%	
	Ranking	6	4	3	2	4	5	3	1	6	
DUT 2019	Female	0	3	2	0	1	0	4	2	1	20%
	Male	2	6	7	4	2	5	0	1	4	
	Ratio F/M	0%	33%	22%	0%	33%	0%	0%	67%	20%	
	Ranking	5	2	3	5	2	5	5	1	4	
Ranking points		23	14	15	17	14	24	21	5	23	
RANKING 11.2017-01.2019		VI	II	III	IV	II	VII	V	I	VI	

Source: own evaluation based on PEESA III project minutes.

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Table 8. Women participation in PEESA III project: per meeting and per team

MEETING	RATIO
USZ 2018	34%
HSFL 2018	31%
CPUT 2018	29%
DUT 2019	20%
TUT 2017	16%

Average per meeting: 26%
Average per university: 25%
(5/9 (**56%**) partners below avg.)

UNIVERSITY	RATIO
USZ	73%
HSW	30%
DUT	26%
HSFL	25%
CPUT	23%
TUT	13%
VUT	12%
ASIIN	10%
LBUS	9%

Source: own evaluation based on PEESA III project minutes.

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I-III.1 Conclusions

Taking into account the assumptions of the project, planned results and the above analysis future activities should focus on:

- the increase in the participation of women in the PEESA project
Average per meeting: 26%
Average per university: 25% (5/9 (**56%**) partners below avg.)

- research about the efficiency of existing activities aiming at promoting the issue of women enrollment in engineering fields (among female from groups of: SA students, SA teaching staff and SA PEESA III team members)

- develop new/ increase existing the number of activities aiming at promoting women employment at SA universities
- develop new/ increase existing the number of activities aiming at promoting women employment in engineering professions
- develop new/ increase existing the number of activities aiming at promoting women empowerment in social and professional life
increase the number of female educators enrolled in engineering courses

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III.2. Promotion of gender equality in higher education in South Africa among staff members

III.2.1 Gender equality questionnaire for academic staff at PEESA III SA partner universities

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DISCLAIMER

- Dear Madame/Sir,
- We kindly ask you to complete the following survey related to activities undertaken within the scope of the project *Personalised Engineering Education in Southern Africa* (PEESA III) – (reference number 585966-EPP-1-2017-1-DE-EPPKA2-CBHE-JP), financed by the European Union programme Erasmus+ Capacity Building in Higher Education. The project is realised by several South African and European univeristies. The PEESA III project members are seeking to understand selected issues related to gender equality at engineering study. The PEESA III Team will ultimately seek to advise decisionmakers on how best to encourage women to study engineering and related disciplines.
- Please note that this is a voluntary survey and you do not have to complete it. You can also withdraw from the survey at any stage without any consequences, and may choose to respond only to selected questions. The survey is completely anonymous and its results will be used only for purposes of PEESA III. The questionnaire should take no more that 10 min to complete. Members of the project will analyse answers, draw general conclusions and discuss these during their dissemination meetings. Some results after generalization can also account for scientific considerations. We would like to express our understanding and respect for spending your time on this questionnaire.

- I understand terms and conditions and want to participate

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Questions

1. Gender:

- ❑ female
- ❑ male
- ❑ other

2. Age:

- ❑ 25 or younger
- ❑ 26 to 35
- ❑ 36 to 45
- ❑ 46 or older

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Questions

3. The length of service as an employee at the University level (years):

- ❑ 5 or less
- ❑ 6 to 10
- ❑ 11 to 20
- ❑ 21 or more

4. Ethnicity/Race:

- ❑ African
- ❑ Coloured
- ❑ Indian
- ❑ White
- ❑ Other _____ (please define)

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Questions

5. University name: _____

6. Faculty / Department name: _____

7. Position at the University:

- ❑ Assistant
- ❑ Assistant professor
- ❑ Professor
- ❑ Lecturer
- ❑ Administrative oficer
- ❑ Technical position
- ❑ Other _____ (please define)

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Questions

8. Employment dimension (status):

- ❑ Full-time
- ❑ Part-time
- ❑ Visiting professor
- ❑ Other _____ (please define)

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9. During your work, did you meet any different treatment related to gender concerning:

Subject	1-not at all	2	3	4	5 - to a large degree
9.1. Assessment system of work					
9.2. Colleagues attitude					
9.3. Financial support					
9.4. Professional or scientific advancement					

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10. Please provide your evaluation of the following segregations related to your gender or ethnicity/race you meet during your job/duties:

Subject	1-not at all	2	3	4	5 - to a large degree
10.1. Horizontal occupational (women still channelled to a specific engineering professions)					
10.2. Vertical/hierarchical (managerial positions are reserved for men – “glass ceiling”)					
10.3. Pay (the wage gap)					
10.4. Shorter or more flexible working hours					
10.5. Career opportunities					
10.6. Preferation of social contacts, friendly work environment, good interpersonal relationships and opportunities for social awards					
10.7. Employer’s aversion to employ women					

Other obstacles/barriers _____ (please define)

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Questions

11. Are you aware gender equality policy at your university?

- ❑ Yes
- ❑ No
- ❑ I do not know

12. Is there any organizational unit/position related to gender equality policy at your university?

- ❑ Yes
- ❑ No
- ❑ I do not know
- ❑ _____ (please define)

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13. Please assess activities/tools you recognize within gender equality policy realization at your university:

Subject	1-not at all	2	3	4	5 - to a large degree
13.1. Implementing curriculum reforms to achieve the goal of gender equality					
13.2. Conducting research on a variety of gender issues and presenting solutions that are valid for the community					
13.3. Organizational policies and programs that enable work-life balance (e.g. flexible working arrangements, child care, career breaks)					
13.4. Money support research on return from maternity leave					
13.5. Identify and recommend female staff to join grant review and journal editorial boards					
13.6. Gender diversity awareness trainings for both men and women					
13.7. Ensure all school websites have images that represent women carrying out a range of roles including teaching and research					

Other _____ (please define)

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Questions

14. Generally speaking, are you satisfied with your decision about teaching/making research at engineering studies?

- ❑ Yes
- ❑ No
- ❑ It's too early to make a statement

15. Other comments:

_____

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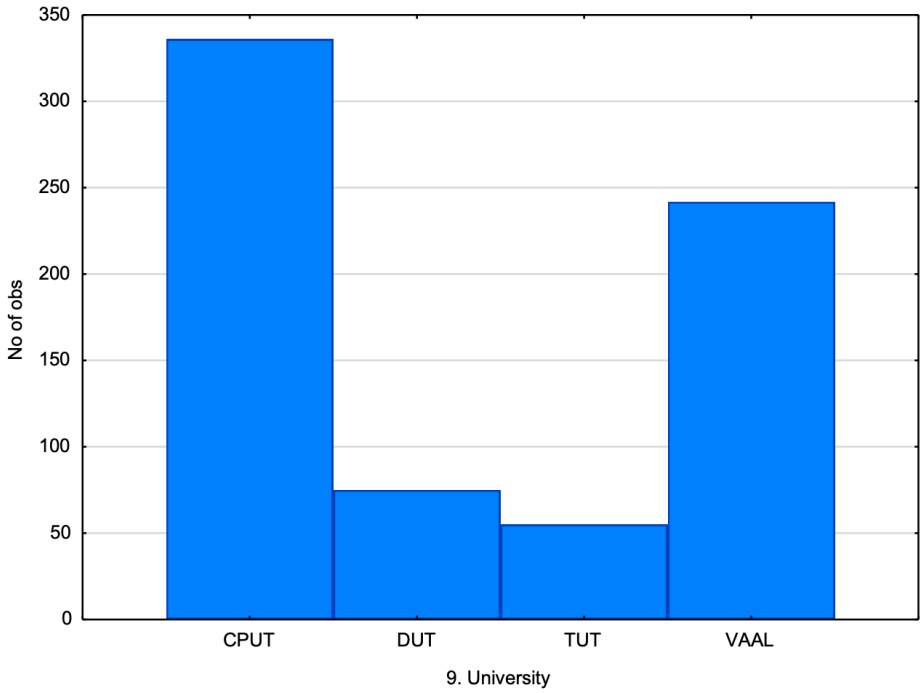
III.3. Promotion of gender equality in engineering education in South Africa among students

III.3.1. Gender equality questionnaire dedicated to students from PEESA III SA partner universities – early results

SAMPLE STRUCTURE AND CHOSEN EXAMPLE OF ANALYSIS

(1st student survey)

1. Number of reliable responses (records):



The highest share of answers was obtained from CPUT students.

2. Sample structure according to Sex and Ethnicity:

		African	Coloured	White	Indian	Total
Count	Male	341	38	39	15	433
Total Percent		48.16%	5.37%	5.51%	2.12%	**61.16%**
Count	Female	241	19	2	13	275
Total Percent		34.04%	2.68%	0.28%	1.84%	**38.84%**
Count	All Groups	582	57	41	28	708
Total Percent		**82.20%**	**8.05%**	**5.79%**	**3.95%**	**100.00%**

The dominant share of student's ethnicity was African.

3. Sample structure according to Sex and Study field

Sex	Construction	Chemical	Civil	Electrical	Industrial	Mechanical
Male	36	22	53	109	35	102
	5.74%	**3.51%**	**8.45%**	**17.38%**	**5.58%**	**16.27%**
Female	24	43	31	54	38	40
	3.83%	**6.86%**	**4.94%**	**8.61%**	**6.06%**	**6.38%**
All Groups	60	65	84	163	73	142
	9.57%	**10.37%**	**13.40%**	**26.00%**	**11.64%**	**22.65%**

The largest part of responses comes from Electrical and Mechanical faculties – almost 50%.

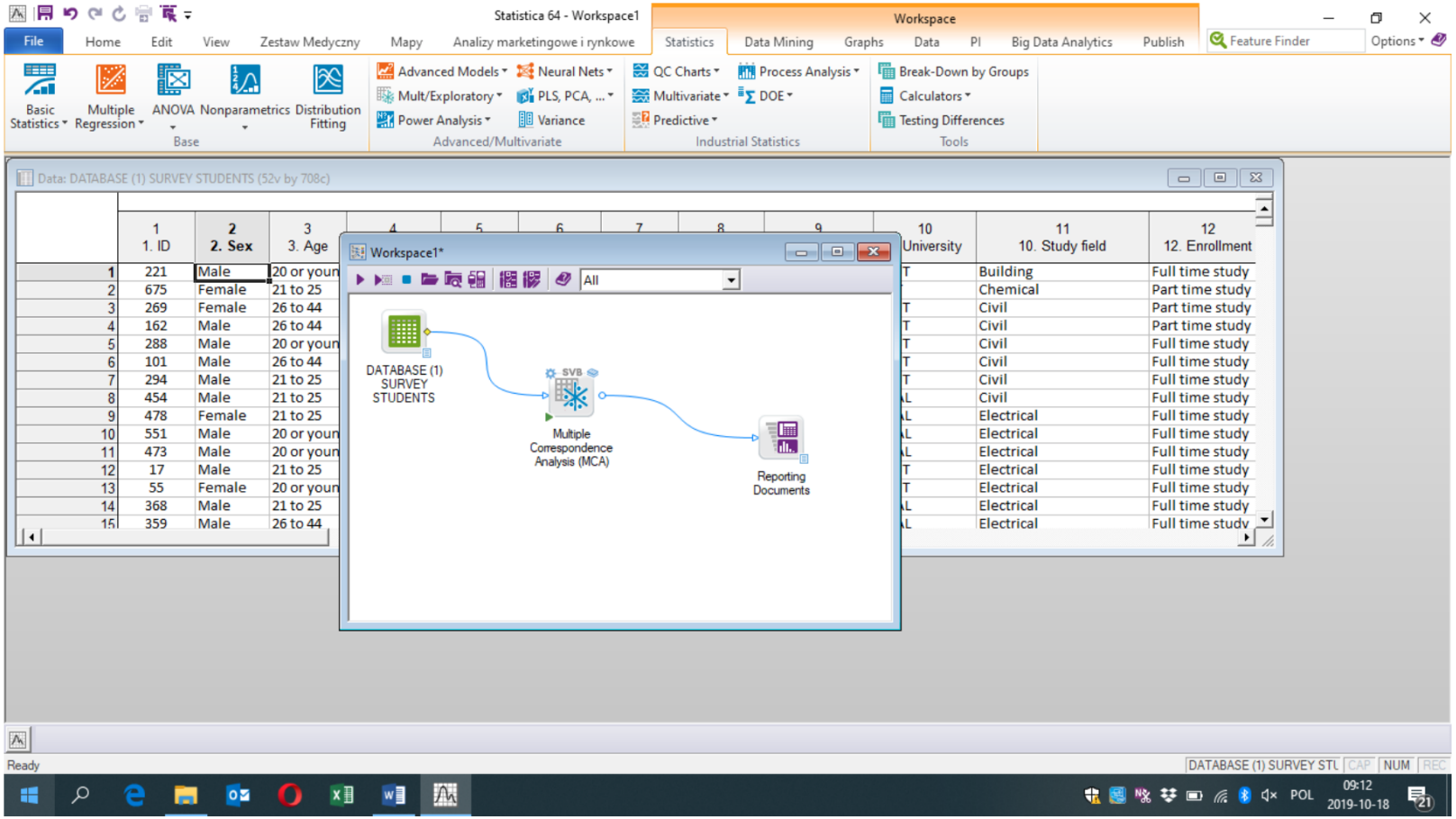
4. Contingency table for Sex / Different treatment in grading system

		Grading system				
		1	2	3	4	5
Count	Male	321	25	41	22	16
Total Percent		46.25%	3.60%	5.91%	3.17%	2.31%
Row Percent		**75.53%**	**5.88%**	**9.65%**	**5.18%**	**3.76%**
Count	Female	196	27	27	11	8
Total Percent		28.24%	3.89%	3.89%	1.59%	1.15%
Row Percent		**72.86%**	**10.04%**	**10.04%**	**4.09%**	**2.97%**

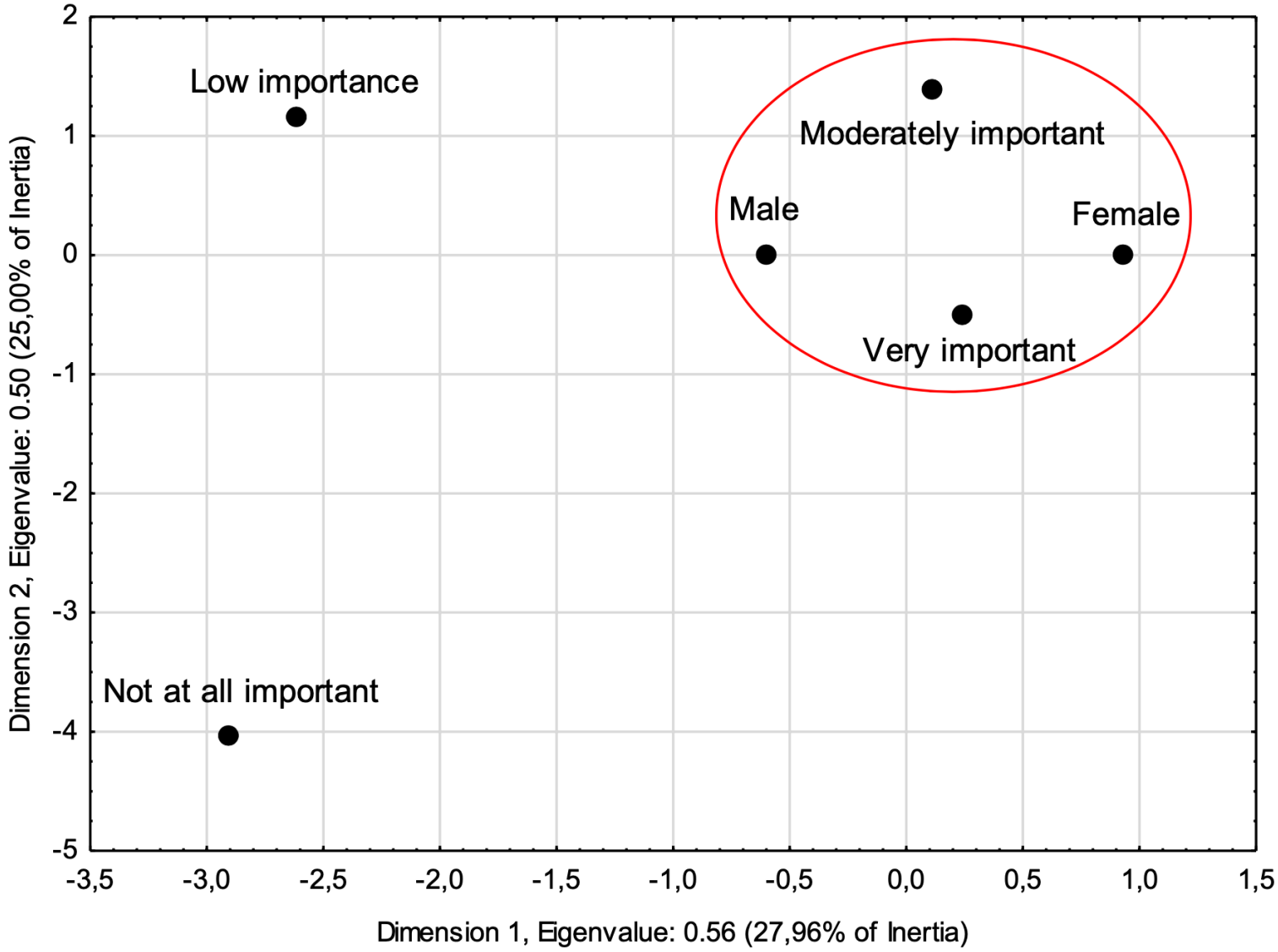
It is visible that more than 80% of students do not observe any different treatment related to grading system due to their gender.

5. Example: if better job prospects after graduation are an important factor to enrol engineering studies (question no. 15.9) – analysis made using STATISTICA 13.3 and multiple correspondence method:

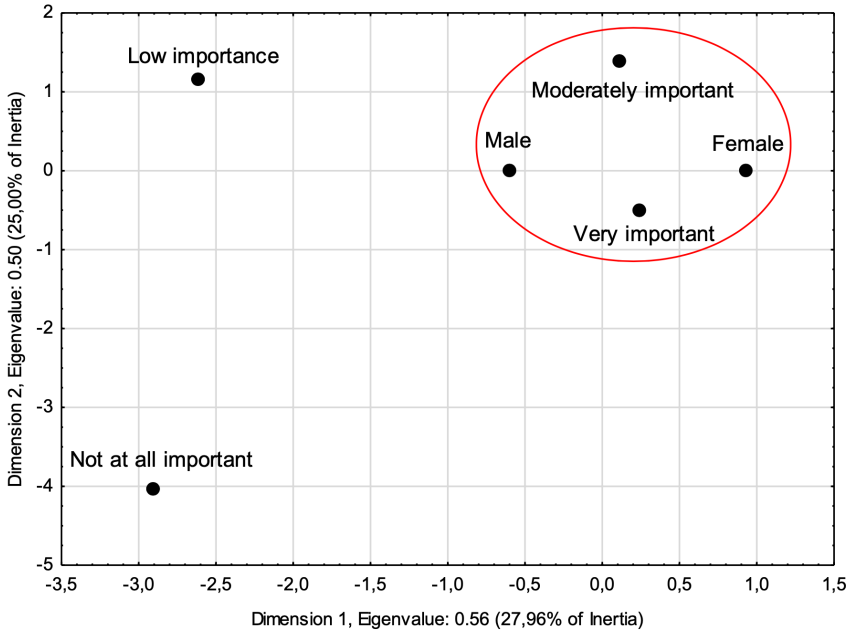
– workspace:



– results:


Low importance
Moderately important
Male
Female
Very important
Not at all important
Dimension 2, Eigenvalue: 0.50 (25,00% of Inertia)
Dimension 1, Eigenvalue: 0.56 (27,96% of Inertia)
2
1
0
-1
-2
-3
-4
-5
-3,5
-3,0
-2,5
-2,0
-1,5
-1,0
-0,5
0,0
0,5
1,0
1,5

– results:



We can observe that better job prospects after graduation are really an important factor to enrol engineering studies, both for men and women (points representing both types of gender are close to two variants of answers: “Very important” and “Moderately important”).

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Thank you for your attention

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Małgorzata Zakrzewska

UNIWERSYTET SZCZECIŃSKI
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