TeComp

Report on the level of PPM knowledge/skills of university teachers and on the current state of technology enhanced teaching and learning in Serbia

July 2019

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**Strengthening Teaching Competences
in Higher Education
in Natural and Mathematical Sciences**

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Project acronym:	**TeComp**
Project full title:	**Strengthening Teaching Competences in Higher Education in Natural and Mathematical Sciences**
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Coordinator Institution:	University of Niš
Coordinator:	Prof. dr Jelena Ignjatović
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Work package:	WP1 – Preparation for strengthening teaching competences in the field of natural sciences and mathematics at the PC HEIs
Lead organization of WP1:	P5-ECUG
Task 1.1	Quantitative analysis of teaching competences of young, newly hired university teachers at the PC HEIs
Task 1.2	Detailed analysis of the use of modern educational technologies in teaching and learning at the PC HEIs
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Report on the Survey of Teacher Attitudes at the University of Nis

Structure of the sample

The survey was filled in by 31 teachers, 14 (45.16%) of whom were women and 17 (54.48%) men. Teachers from six areas were present in the sample in the following way: mathematics (6), geography (4), computer science (9), physics (3), chemistry (5) and biology (4).

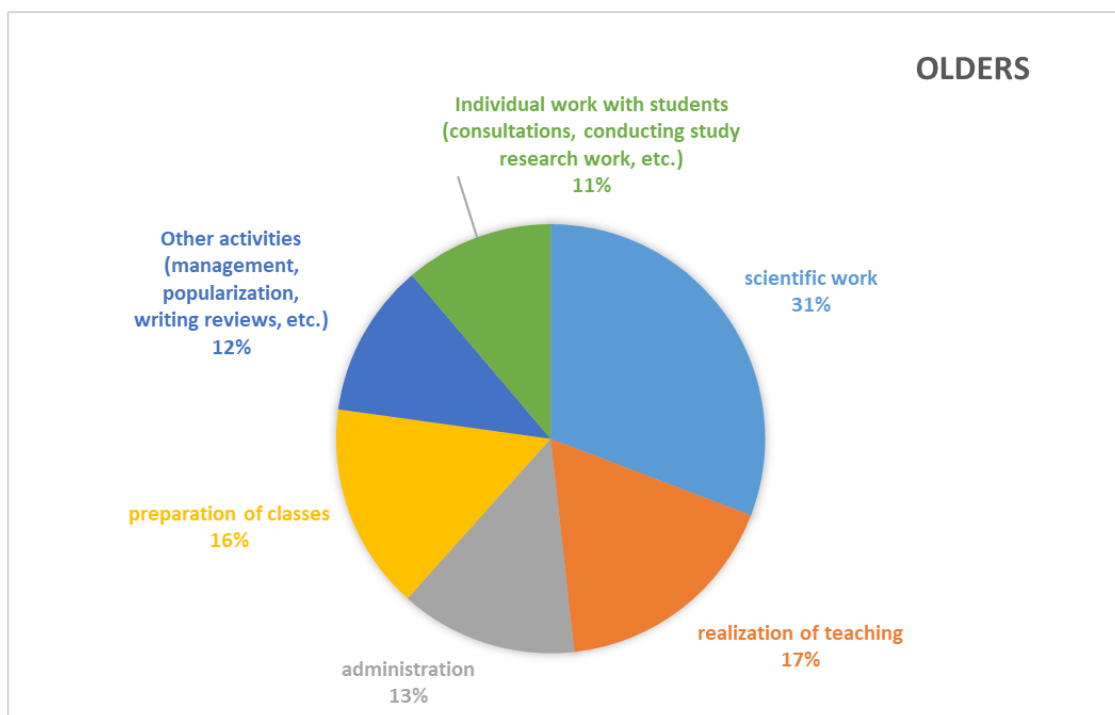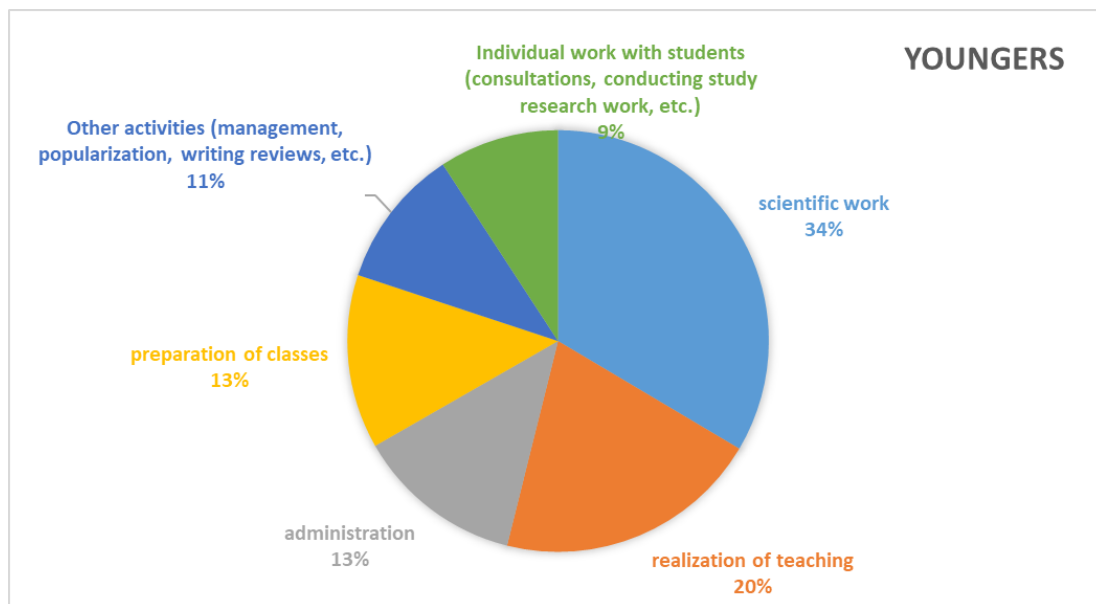The survey was conducted electronically during April 2019.

Teaching experience at the university

The average number of years of teaching experience is 15.26 years (the standard deviation is 6.15 years). The shortest teaching experience in the sample is 5 years, while the longest teaching experience is 30 years. In the further report, we will consider teachers and associates whose work experience is up to 12 years under the younger teaching staff, while older teachers will consider teachers with experience over 12 years. Translated to the age of the respondents, we can identify 12 years of experience with 35 years of age.

Evaluation of weekly engagement

Work at the university allows for a significant individual distribution of time. For these reasons, teachers / associates filled out how many hours of work were active during the week and how it was arranged. Average respondents said they spend 47.15 hours of work on different activities (with a standard deviation of 12.54). Operating hours vary from 25 hours to 75 hours. The amount of time spent in the week on individual activities is given in Table 1 and Figure 1.

activity	average number of hours all	average number of hours-youngers	average number of hours - olders	p-value	significance
scientific work	**15.0** (5.05)	13.91 (4.44)	15.63 (5.39)	0.377	NO
realization of teaching	**8.7** (3.32)	8.45 (3.42)	8.84 (3.35)	0.764	NO
administration	**6.25** (6.25)	5.32 (5.87)	6.79 (6.55)	0.544	NO
preparation of classes	**7.03** (2.85)	5.54 (2.73)	7.89 (2.60)	0.026	**YES**
Other activities (management, popularization, writing reviews, etc.)	**5.34** (4.48)	4.45 (3.11)	5.89 (5.16)	0.413	NO
Individual work with students (consultations, conducting study research work, etc.)	**5.00** (3.29)	3.82 (2.23)	5.68 (3.65)	0.137	NO
IN TOTAL	**47.15** (12.54)	41.50 (7.75)	50.42(13.76)	0.059	**YES**

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YOUNGERS

Individual work with students (consultations, conducting study research work, etc.) 9%

Other activities (management, popularization, writing reviews, etc.) 11%

preparation of classes 13%

administration 13%

scientific work 34%

realization of teaching 20%

OLDERS

Individual work with students (consultations, conducting study research work, etc.) 11%

Other activities (management, popularization, writing reviews, etc.) 12%

preparation of classes 16%

administration 13%

scientific work 31%

realization of teaching 17%

Courses in methodology

courses	in total	younger	older
Electronic learning methodology	9 (30.00%)	2 (18.18%)	7 (36.84%)
Methodology of teaching	14 (46.67%)	3 (27.27%)	11 (57.89%)

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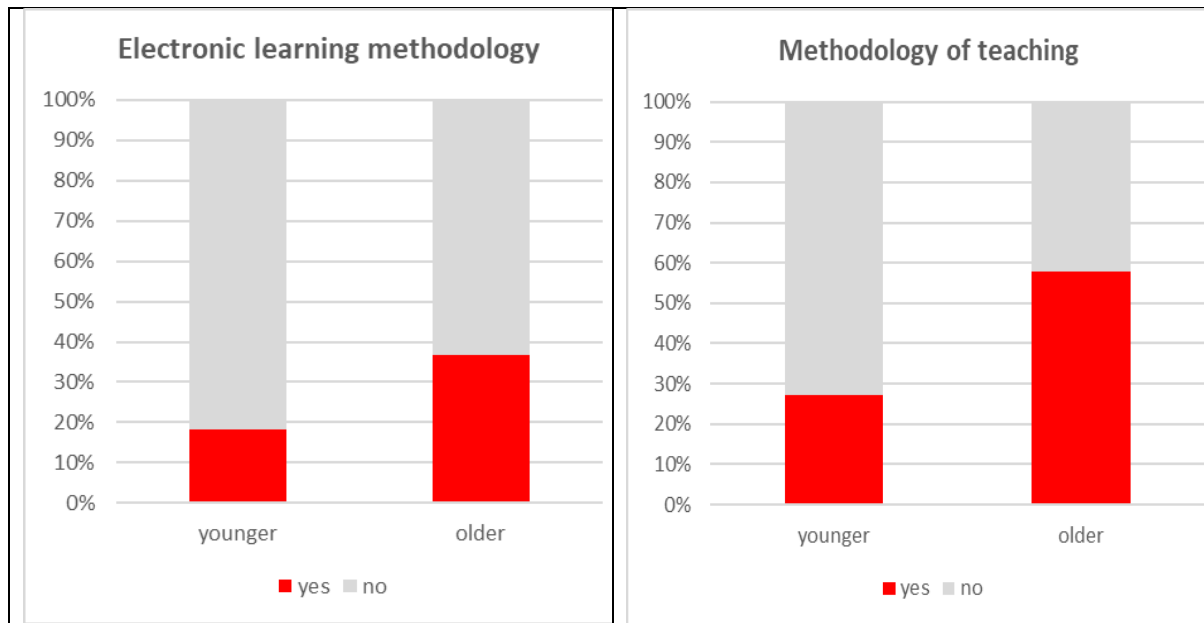
Since 11 respondents attended the e-learning methodology, in the following table we list which areas were listened to:

Areas	number of respondents
Electronic publishing (Latex, HTML, XML, PDF, etc.)	6=5+1 [1]
Online Technology in Teaching	3=3+0
Open source software (MOODLE, Python, GeoGebra, MOOC, etc.)	5=3+2

[1] We note that there are cases and there are respondents who have declared that they have not been listening to the method of electronic learning but have listened to some of the contents listed in the previous table. The first one is the number of respondents who have attended the method of electronic learning, while the second one is the number of respondents who did not attend

At Question: *Did you give at least one lecture in English. If yes, specify when and where*, less than 15%, or 4 respondents answered yes.

At Question: *Have you prepared at least one lecture or part of the lecture on the electronic platform. If yes, specify on which platform* only 3 respondents answered yes (and they used the Moodle platform or Office 365 Education).

Question	younger	older	IN TOTAL
Have you participated in a professional conference whose emphasis was on applying innovative teaching technologies?	3 (27.27%)	9 (47.37%)	12 (40.00%)
Have you ever discussed with students about the impact of using modern technologies on the quality of teaching and learning?	8 (72.73%)	16 (84.21%)	24 (80.00%)

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Attitudes on the use of ICT in teaching

Respondents answered how much the following claims are true for them on the five-level Lihter scale (1- It's not true at all; 2 - It's not true in general; 3- Equally true and not true; 4 - Generally true. 5. Totally true).

notation	Statements
p1	The use of new technologies in teaching is very important for the quality of the lecture.
p2	Group work, multimedia presentations and modern software capabilities save valuable teachers time.
p3	Student presentations and discussions save time for the teacher.
p4	You want to improve your teaching skills using information technology, because it would help you prepare lessons easier.
p5	You want to improve your teaching skills using information technology, because it will bring you more respect from students.
p6	You want to improve your teaching skills using information technology, because it will bring you more respect from colleagues

	1	2	3	4	5
p1	0	1	1	22	6
p2	1	2	5	12	10
p3	2	3	11	12	2
p4	1	0	2	17	10
p5	0	7	11	11	2
p6	5	4	13	8	1
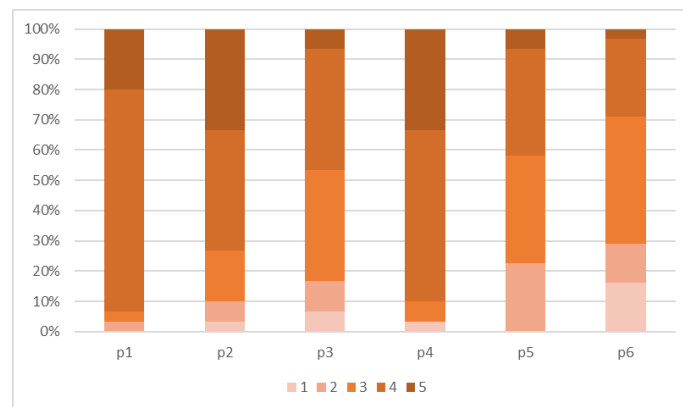
Distribution of the response to the six observed claims

statement	TOTAL			YOUNGER			OLDER		
	mean	median	mode	mean	median	mode	mean	median	mode
p1	4.1	4	4	4.182	4	4	4.053	4	4
p2	3.933	4	4	3.909	4	4	3.947	4	5
p3	3.3	3	4	3.455	3	3	3.211	3	4
p4	4.167	4	4	3.909	4	4	4.316	4	4
p5	3.258	3		3.083	3		3.368	3	3
p6	2.871	3	3	2.917	3	3	2.842	3	3

Mean response values of the respondents

CONCLUSION: All the teachers agree that the quality of their lectures will be better if they use the contemporary technologies in teaching. If we look at the response values, we will notice that the opinion of younger and older professors is almost identical about all the issues. The least number of respondents (the average for question p6 is 2.871) consider that improving their teaching skills is important for bringing greater respect from their colleagues. The results show that the greatest score (even above 4.1) got the opinion that using ICT in teaching is very important for the quality of

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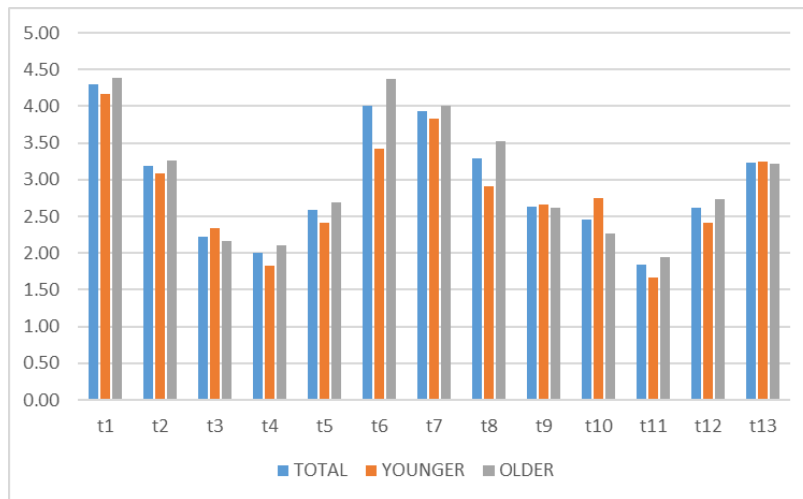Co-funded by the
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the lecture and that it helps in easier preparation lessons. Most of them have opinion that group work, multimedia presentations and modern software capabilities save valuable teachers time.

SELF ASSESSMENTS OF ICT COMPETENCES

Respondents assessed their knowledge of ICT on the five-level Lihter scale (1- Not true 2- not true in general 3- neither not true nor true 4-true in general 5-totally true), indicating in what degree they agreed with the following claims

notation	statement
t1	The level of your knowledge and skills in applying Office software package:
t2	Level of your knowledge and skills in applying Open Source software:
t3	Level of your knowledge and skills in implementing Web conferencing software:
t4	Level of your skills in the application of Learning Management System (LMS):
t5	The level of your knowledge and skills in applying online learning platform:
t6	Use electronic materials (presentations) as teaching materials.
t7	Use electronic books / textbooks as teaching materials.
t8	Use animations / movies as teaching material.
t9	Use forums and other forms of online communication in teaching and learning.
t10	Use online courses as a teaching material.
t11	Use web conferences as a teaching material.
t12	Use databases in teaching and learning.
t13	You are open to communicating with students via social networks (Facebook, Twitter, etc.).

statement	TOTAL			YOUNGER			OLDER		
	mean	median	mode	mean	median	mode	mean	median	mode
t1	4.30	4	5	4.17	4	4	4.39	4.5	5
t2	3.19	3	3	3.08	3	3	3.26	3	3
t3	2.23	2	3	2.33	2	2	2.16	2	3
t4	2.00	2		1.83	2	2	2.11	2	1
t5	2.58	3	3	2.42	3	3	2.68	3	
t6	4.00	4	4	3.42	4	4	4.37	4	4
t7	3.94	4	4	3.83	4	4	4.00	4	4
t8	3.29	4	4	2.92	3		3.53	4	4
t9	2.63	3	3	2.67	3	3	2.61	2.5	1
t10	2.45	2	2	2.75	2.5	2	2.26	2	1
t11	1.84	2	1	1.67	1	1	1.95	2	1
t12	2.61	3		2.42	3	3	2.74	3	1
t13	3.23	3		3.25	3	3	3.21	4	4

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CONCLUSION: As it can be seen, the assessments of young and older teachers are pretty uniform here, too. The respondents assessed their knowledge and skills related to the Office software package with very high score (4.30) as well as using of electronic materials (presentations) as teaching materials (average score for t6 is 4.00) and using of electronic books/textbooks as teaching materials (average 3.94). Very rarely teachers use web conferences as a teaching material (1.84) and most of them have undeveloped knowledge/skills on using LMS, Moodle for example (average 2.00). The self-assessment for all other questions is less than 3, or very little above 3 what indicates that improving ICT knowledges and skills in teaching process is more than necessary.

Can you notice the benefits of applying modern technology in teaching and learning?
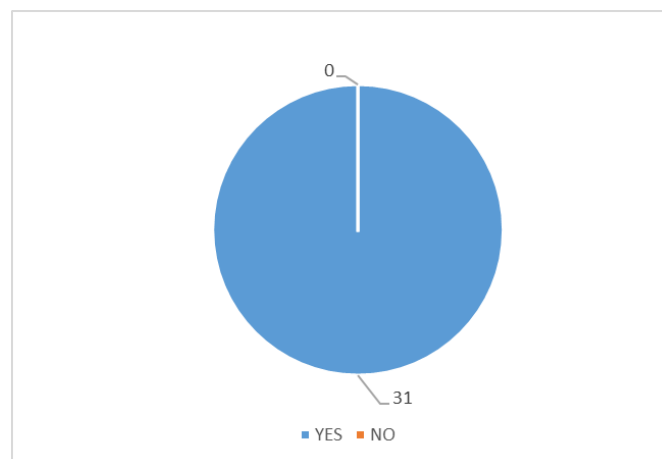
What are these benefits?

Benefit	YES	%
Save time	14	45.16%
It facilitates the preparation of classes	16	51.61%
Increases students' level of interest	26	83.87%
Increases the quality of teaching materials	23	74.19%
It makes learning easier	21	67.74%
Improves communication between teachers and students	20	64.52%

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CONCLUSION: All the teachers (100%) notice the benefits of using ICT in the teaching and learning, and they think that, the most important advantage of using modern technologies in teaching and learning, is increasing student level of interest, but the benefits like increasing the quality of teaching materials (74.19%), easier learning (67.74%) and better communicationbetween teachers and students (64.52%) are very important, too.
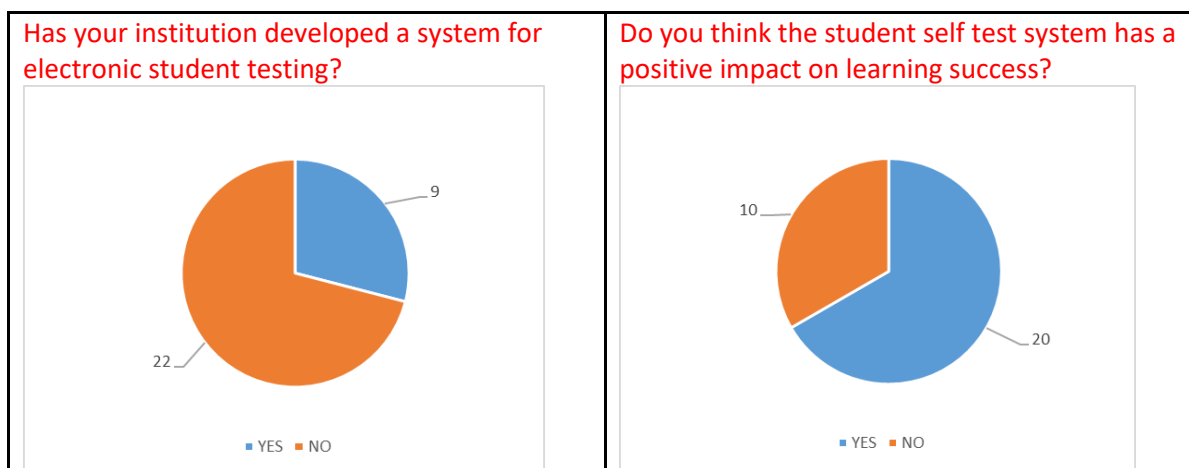
Do you use some free online learning platforms for courses? If your answer is YES, please indicate the platforms you are using.
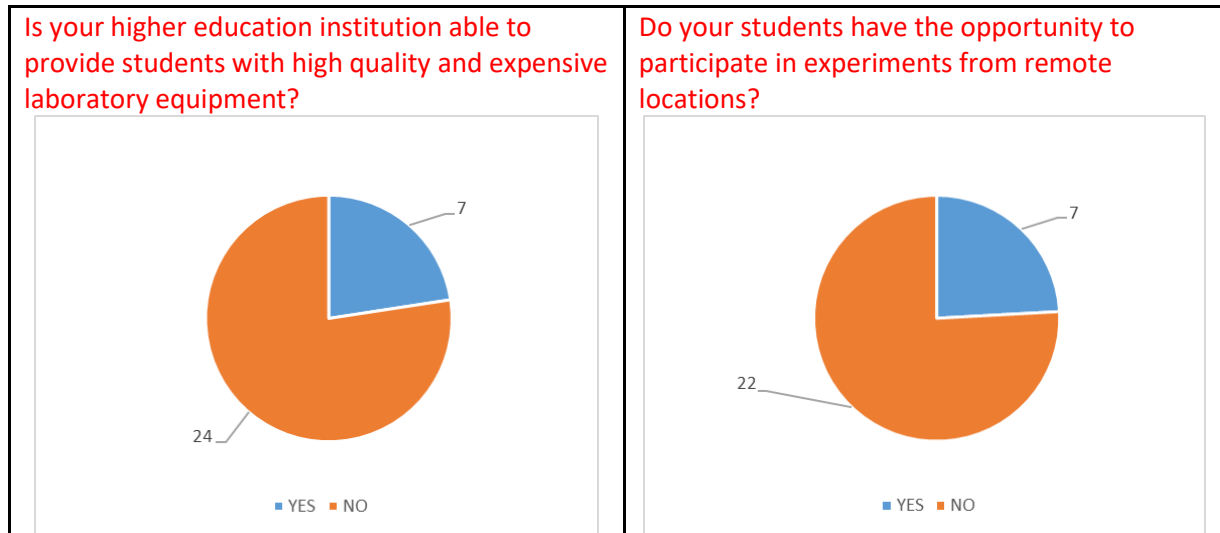
Moodle	4	13.33%
Nasport	1	3.33%
teaching platform	1	3.33%
Coursera	1	3.33%
No	24	80.00%

CONCLUSION: Unfortunately, most of the respondents (80.00%) do not use any learning platform. The greatest number of teachers who work on platforms use Moodle (13.33%). Using of online free learning platforms is needed to be promoted and implemented in teaching because of their importance for modernization of education.

Do you think that using the online learning platform can:

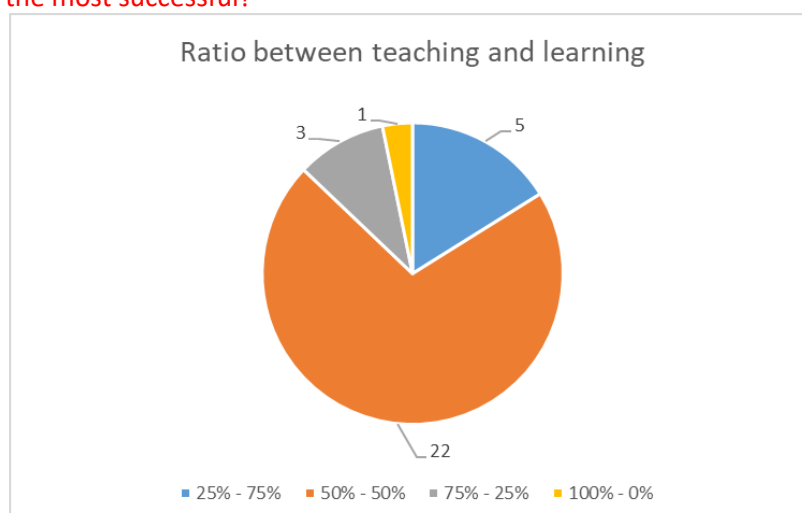|	YES	%
Enable students easier and faster access to learning materials	29	93.55%
Enable students easier and faster access to relevant information	20	64.52%
Allow students access to materials at any time	26	83.87%
Contribute to the realization of the active role of students	20	64.52%
Contributes to the individualisation of learning	13	41.94%
Improves communication between teachers and students	14	45.16%

Has your institution developed a system for electronic student testing?

Do you think the student self test system has a positive impact on learning success?

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Is your higher education institution able to provide students with high quality and expensive laboratory equipment?

- YES - NO

Do your students have the opportunity to participate in experiments from remote locations?

- YES - NO

The most important barriers to applying modern teaching technologies in teaching and learning are:

	YES	%
Lack of ICT skills	19	61.29%
Lack of time	5	16.13%
Lack of hardware	16	51.61%
Lack of software	21	67.74%
Inability to access computers	8	25.81%

CONCLUSION: Teachers recognize that usage of online learning platforms is very important and useful, because these platforms enable students easier and faster access to learning materials and relevant information at any time and contribute to the realization of the active role of students, but the respondents, also notice that there are significant obstacles in applying modern teaching technologies. Most of them, 67.74% recognize the lack of software and 61.29% see the lack of ICT skills as the main barriers. The lack of hardware is stated as a barrier in using modern technologies in teaching by 51.61% of the respondents, but this is purely financial problem.

In your opinion, what ratio (in percent) should be between teaching and learning in education to make education the most successful?

Ratio between teaching and learning

- 25% - 75% - 50% - 50% - 75% - 25% - 100% - 0%

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Pedagogical methods and teaching skills

Level of skills in English

	low	middle	high
Listening	1	6	24
reading	0	8	23
writing	3	11	17
talk	3	13	15

CONCLUSION: Majority of teachers self-assessed their English language competences with high marks.

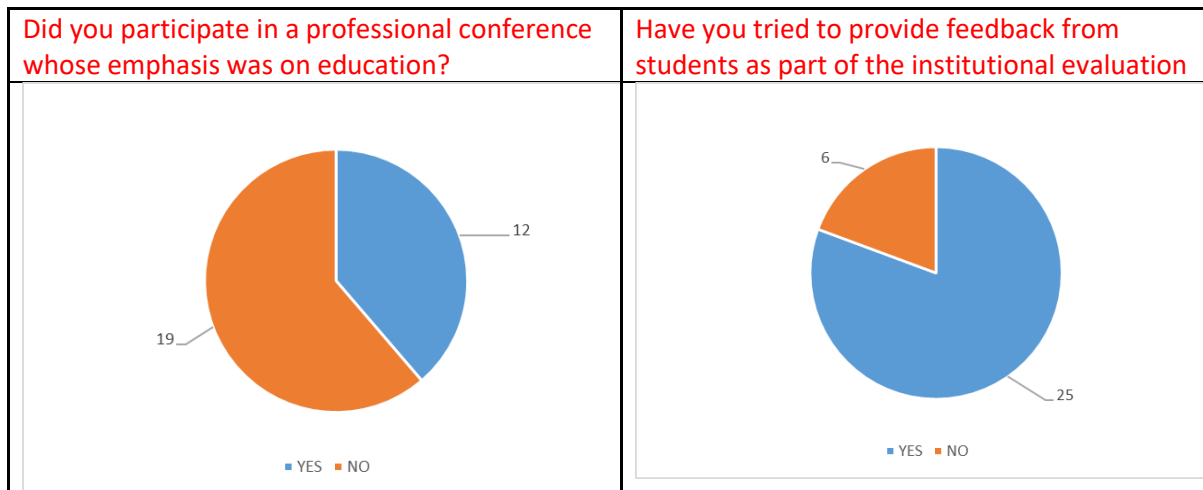Have you ever attended a course in one of the listed disciplines during your formal education?

course	YES	NO
Pedagogy	14	16
Psychology	15	15
Teaching methodology	10	18
Application of new technologies in teaching	8	19
English language	27	4
You have not attended a course of any of these disciplines		14

Have you ever held a course or have educated yourself informally (consulting some of the sources: books, articles, online resources, professional organizations, experienced colleagues, mentors, etc.) from one of the above disciplines during your career

course	YES	NO
Pedagogy	7	21
Psychology	10	18
Teaching methodology	13	15
Application of new technologies in teaching	17	12
English	14	13
You have not taught or learned a course of any of these disciplines		16

Do you consider that the teaching skills of university professors are very important for the quality of their classes?

I totally agree	27
I partially agree	4
I do not agree	0

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Did you participate in a professional conference whose emphasis was on education?	Have you tried to provide feedback from students as part of the institutional evaluation

What would motivate you to engage in improving your teaching competencies?

Get more respect from colleagues or students	9	29.03%
Possibility of easier preparation of classes	11	35.48%
Achieve better quality of teaching	27	87.10%
Attracting more students to elective courses	19	61.29%
Getting some financial or material compensation	7	22.58%
You are not interested	0	0.00%

CONCLUSION: About half of the respondents attended courses Pedagogy, Psychology, while less number of them (about one-thirds) attended courses in Teaching methodology during their formal education. Very small percent of the teachers attended courses about using contemporary technologies in teaching, but most of them educated themselves in using ICT during their carrier. Only a quarter of them had a dedicated ICT course. Most of the teachers consider that the teaching skills are very important for the quality of teaching process and, also 87.10% of the respondents stated that their main goal is to achieve better quality of teaching. All responses indicate that there is a strong teachers' motivation to improve teaching, so we strongly believe that training courses and well-organized education material can give excellent results.
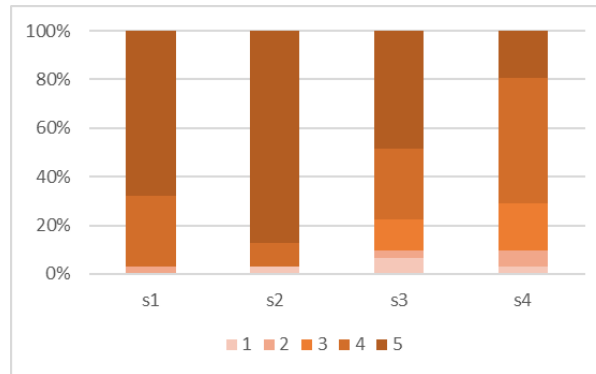
Application of educational strategies, English language and technology in teaching

On the five-level Lihter scale (1- It's not true at all; 2 - It's not true at all; 3- Equally true and not true; 4 - Generally true. 5. Totally true) responded how much the following claims are true for them

Teaching strategies involving students

notations	statement
s1	You provide feedback to students about test solutions, tasks, and ongoing work.
s2	You provide clear information to students on how to evaluate the course they attend.
s3	You give students clear instructions on how to prepare for the next hour.
s4	You give students homework, short-term assignments, an obligation to read something or some other form of preparation for the coming time.

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	1	2	3	4	5
s1	0	1	0	9	21
s2	1	0	0	3	27
s3	2	1	4	9	15
s4	1	2	6	16	6

Distribution of the answers to the observed claims

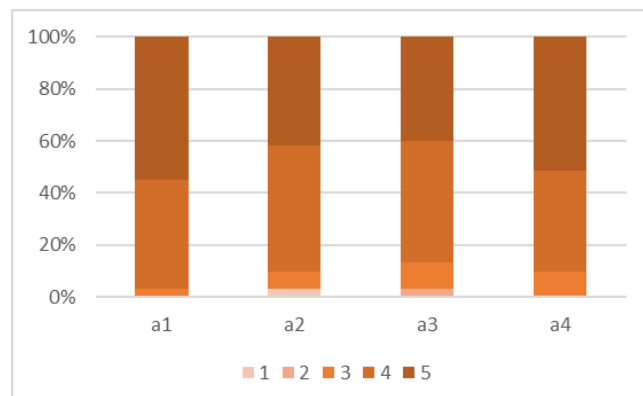| statement	TOTAL			YOUNGER			OLDER		
	mean	median	mod	mean	median	mod	mean	median	mod
s1	4.613	5	5	4.667	5	5	4.579	5	5
s2	4.774	5	5	4.917	5	5	4.684	5	5
s3	4.097	4	5	4.25	4	4	4	5	5
s4	3.774	4	4	3.583	4	4	3.895	4	4

Mean response values of the respondents

CONCLUSION: All the teachers assessed with high-grade their educational strategies about involving students. About 90% of them provide clear information to students on how to evaluate the course, the truthfulness of the claim s1 is very good, too, while the smallest is number of teachers (younger as well as older) who give students homework, short-term assignments or some other form of preparation for the coming time.

Intellectual engagement and impact on learning

notations	statement
a1	You motivate and encourage students to develop new ideas and find creative solutions to problems during learning.
a2	You motivate students to seek more solutions to the same problem and compare them.
a3	Usually, you initiate a discussion on classes, about solving complex problems.
a4	You ask students to explain their ideas.

	1	2	3	4	5
a1	0	0	1	13	17
a2	1	0	2	15	13
a3	0	1	3	14	12
a4	0	0	3	12	16

Distribution of the answers to the observed claims

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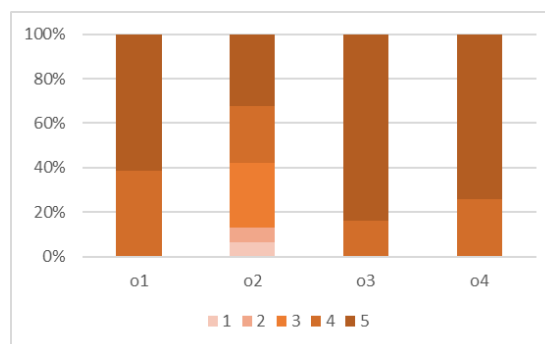| statements	TOTAL			YOUNGER			OLDER		
	mean	median	mod	mean	median	mod	mean	median	mod
a1	4.516	5	5	4.417	4	4	4.579	5	5
a2	4.258	4	4	4.333	4	4	4.211	4	5
a3	4.233	4	4	4.25	4	4	4.222	4	
a4	4.419	5	5	4.667	5	5	4.263	4	4

Mean response values of the respondents

CONCLUSION: The respondents rated all the claims from this group with very high grades, which means that they agree with all the claims.

Relationship: teacher-student

notations	statement
o1	Students with you communicate openly and freely.
o2	You are open to various forms of electronic communication through social networks (Facebook, Twitter, etc.).
o3	Relate to the students with respect.
o4	You are communicating with students with a smile and a warm and friendly tone.

	1	2	3	4	5
o1	0	0	0	12	19
o2	2	2	9	8	10
o3	0	0	0	5	26
o4	0	0	0	8	23

Distribution of the answers to the observed claims

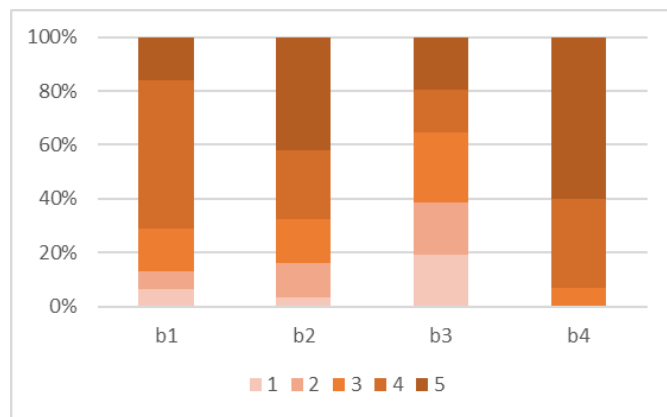| statements	TOTAL			YOUNGER			OLDER		
	mean	median	mod	mean	median	mod	mean	median	mod
o1	4.613	5	5	4.667	5	5	4.579	5	5
o2	3.71	4		3.75	3.5	3	3.684	4	4
o3	4.839	5	5	5	5	5	4.737	5	5
o4	4.742	5	5	4.75	5	5	4.737	5	5

Mean response values of the respondents

CONCLUSION: The responses show that the teachers highly estimate their relations to students with respect, thy communicate with students with smile and friendly tone, while the less number is open for communication through social networks.

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Cooperation

notations	statement
b1	You give students group assignments that they need to finish at class or at home.
b2	You motivate students to share their knowledge and help other students during classes or during the preparation of the exam.
b3	Use collaborative software in communicating with students (Google Docs, Wikis, etc.).
b4	You expect students to engage in discussion and express their opinion.

	1	2	3	4	5
b1	2	2	5	17	5
b2	1	4	5	8	13
b3	6	6	8	5	6
b4	0	0	2	10	18

Distribution of the answers to the observed claims

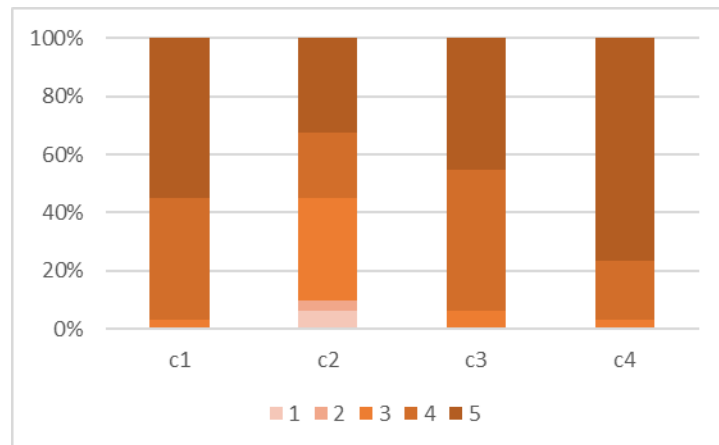|	TOTAL			YOUNGER			OLDER		
statements	mean	median	mod	mean	median	mod	mean	median	mod
b1	3.677	4	4	3.333	3.5	4	3.895	4	4
b2	3.903	4	5	3.417	3.5		4.211	5	5
b3	2.968	3	3	2.917	2.5		3	3	3
b4	4.533	5	5	4.417	4.5		4.611	5	5

Mean response values of the respondents

CONCLUSION: In the group of claims on cooperation the teachers very poorly use collaborative software in communication with students. About all demands both younger and older respondents have almost the same assessment.

Student-centered teaching and learning

notations	statement
c1	You are ready to make certain changes to the contents of your course, to accommodate it to the needs of students.
c2	You respect the priorities and wishes of the students by giving them individual tasks.
c3	Link the contents of your courses with previous knowledge and experience of students.
c4	You are interested in the opinions of students.

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	1	2	3	4	5
c1	0	0	1	13	17
c2	2	1	11	7	10
c3	0	0	2	15	14
c4	0	0	1	6	23

Distribution of the answers to the observed claims

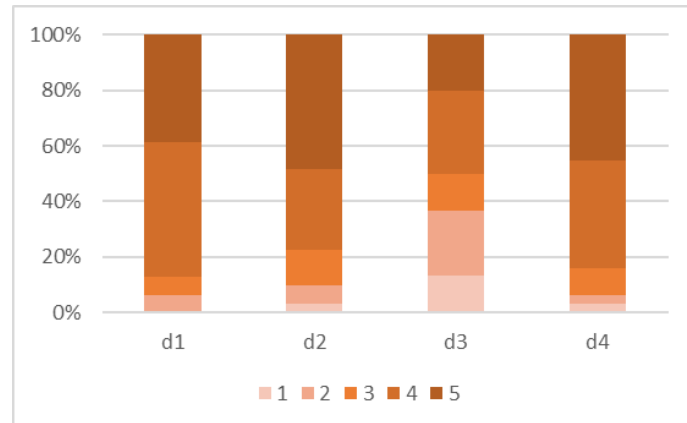| statements	TOTAL			YOUNGER			OLDER		
	mean	median	mod	mean	median	mod	mean	median	mod
c1	4.516	5	5	4.417	4.5		4.579	5	5
c2	3.71	4	3	3.417	3	3	3.895	4	5
c3	4.387	4	4	4.25	4	4	4.474	5	5
c4	4.733	5	5	4.545	5	5	4.842	5	5

Mean response values of the respondents

CONCLUSION: Teachers estimate that they are oriented to student-centered teaching and learning. They are very interested in students' opinion and take care of students' wishes and priorities to improve teaching process (the average for all claims is greater than 3.7). Students assessments of truthfulness of these statements are on the lower level and it would be useful to

find deeper reasons for this disagreement.

Enthusiasm and way of teaching

notations	statement
d1	You change teaching methods to maintain students' interest.
d2	You use electronic books, presentations, video clips, movies, and more. at their classes.
d3	You use work in pairs, group work, workshops and other techniques to improve interaction during classes.
d4	You motivate students to search for new learning resources beyond required materials and critically assess their reliability.

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	1	2	3	4	5
d1	0	2	2	15	12
d2	1	2	4	9	15
d3	4	7	4	9	6
d4	1	1	3	12	14

Distribution of the answers to the observed claims

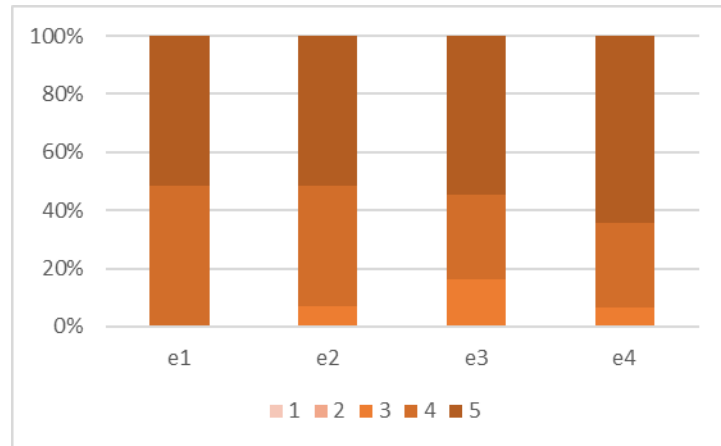| statements	TOTAL			YOUNGER			OLDER		
	mean	median	mod	mean	median	mod	mean	median	mod
d1	4.194	4	4	4.083	4	4	4.263	4	5
d2	4.129	4	5	3.333	3.5	4	4.632	5	5
d3	3.2	3.5	4	2.833	2.5	2	3.444	4	4
d4	4.194	4	5	4	4	4	4.316	5	5

Mean response values of the respondents

CONCLUSION: Less than 50% of teachers estimate the statement d3 that refers to the work in pairs or groups, workshops and other techniques during classes with highest level marks. Majority of teachers (two-third of them) stated that in general they are in general or completely ready to adopt teaching methods to maintain students' interest adapt methods and type of work to students while 90% of respondents consider that they motivate students for active learning.

Structure

Notation	Statement
e1	During the lessons you summarize the material and highlight the most important parts.
e2	During the lessons you adjust the time of instruction and manage the time of the organization of the classes well.
e3	Organize and structure teaching materials
e4	You make sure that your classes are well organized.

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	1	2	3	4	5
e1	0	0	0	15	16
e2	0	0	2	12	15
e3	0	0	5	9	17
e4	0	0	2	9	20

Distribution of the answers to the observed claims

statements	TOTAL			YOUNGER			OLDER		
	mean	median	mod	mean	median	mod	mean	median	mod
e1	4.516	5		4.333	4	4	4.632	5	5
e2	4.448	5	5	4.5	4.5	4	4.412	5	5
e3	4.387	5	5	4.333	4.5	5	4.421	5	5
e4	4.581	5	5	4.417	4	4	4.684	5	5

Mean response values of the respondents

CONCLUSION: All the statements considering the structure of classes and teaching materials are rated high, especially by older respondents, while about 50% of students stated that majority of teachers practice the activities mentioned in the above statements. Nevertheless, a significant number of students chose the option *A few teachers* which indicates that there is space for strengthening teaching competences for a large number of teachers.

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Report on the Survey of Teacher Attitudes at the University of Belgrade

Structure of the sample

The survey was filled in by 57 teachers, 65.45% of whom were women and 34.55% men. Teachers from three areas were present in the sample in the following way: computer science (2), physics (5) and biology (50).

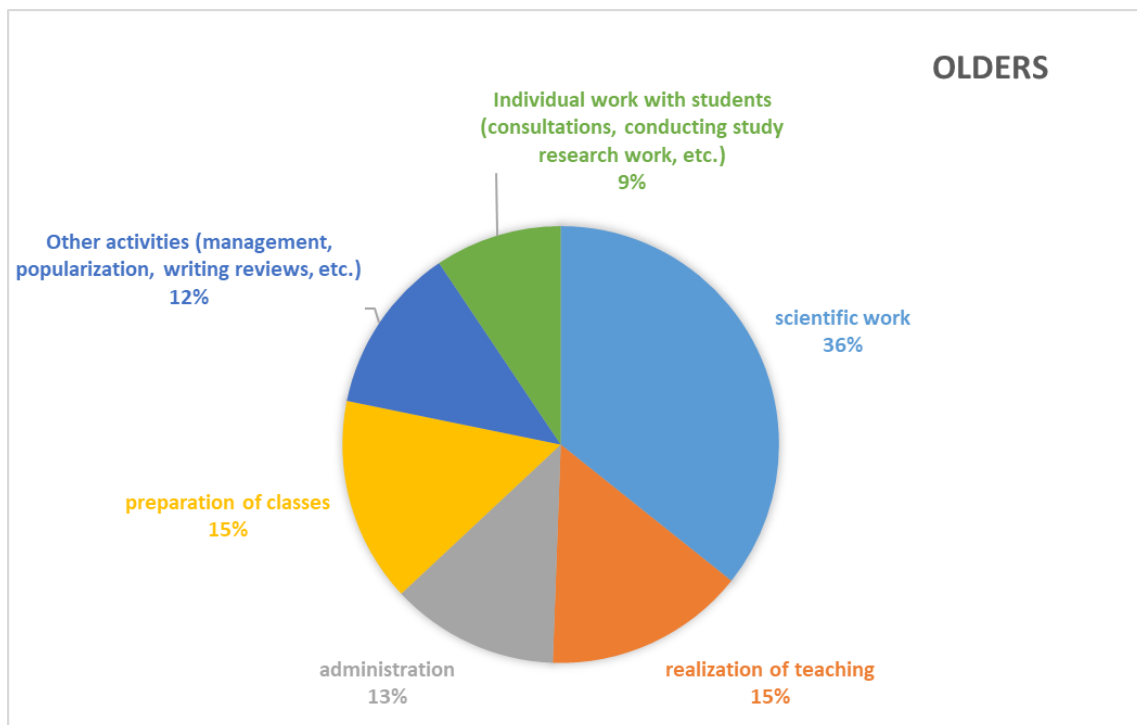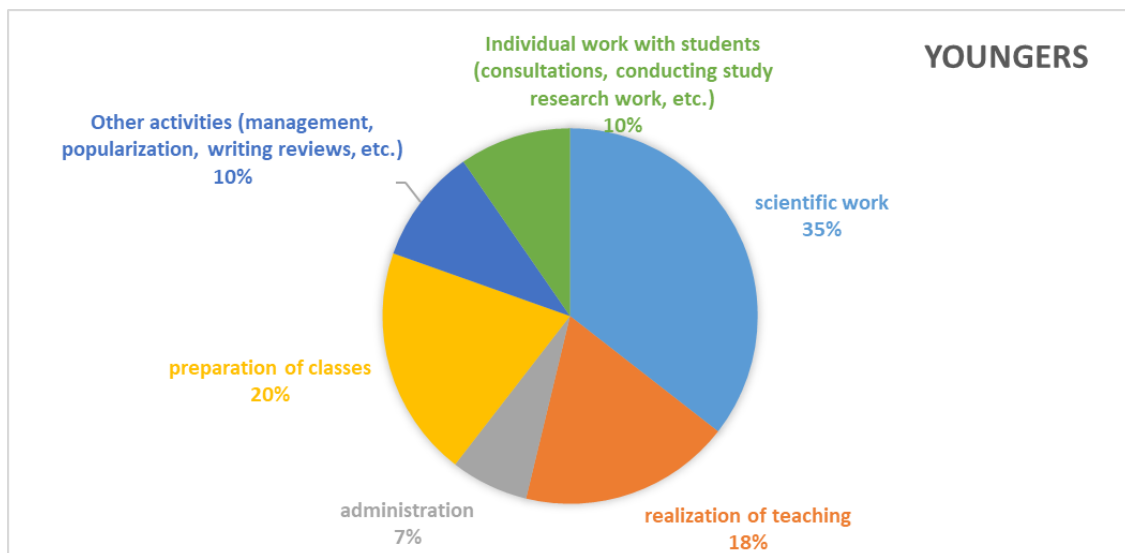The survey was conducted electronically during April 2019.

Teaching experience at the university

The average number of years of teaching experience is 17.04 years (the standard deviation is 10.1 years). The shortest teaching experience in the sample is 1.5 year, while the longest teaching experience is 40 years. In the further report, we will consider teachers and associates whose work experience is up to 12 years under the younger teaching staff, while older teachers will consider teachers with experience over 12 years. Translated to the age of the respondents, we can identify 12 years of experience with 35 years of age.

Evaluation of weekly engagement

Work at the university allows for a significant individual distribution of time. For these reasons, teachers / associates filled out how many hours of work were active during the week and how it was arranged. Average respondents said they spend 49.43 hours of work on different activities (with a standard deviation of 13.43). Operating hours vary from 15 hours to 88 hours. The amount of time spent in the week on individual activities is given in Table 1 and Figure 1.

activity	average number of hours all	average number of hours-youngers	average number of hours - olders	p-value	significance
scientific work	**17.80** (5.06)	17.35 (5.59)	18.13 (4.70)	0.580	NO
realization of teaching	**8.13** (4.90)	8.91 (5.57)	7.54 (4.34)	0.316	NO
administration	**5.03** (3.97)	3.28 (2.31)	6.32 (4.45)	0.004	**YES**
preparation of classes	**8.56** (5.03)	9.73 (6.27)	7.70 (3.79)	0.153	NO
Other activities (management, popularization, writing reviews, etc.)	**5.71** (4.74)	4.86 (5.04)	6.29 (4.51)	0.289	NO
Individual work with students (consultations, conducting study research work, etc.)	**4.74** (3.47)	4.70 (3.61)	4.77 (3.41)	0.935	NO
IN TOTAL	**49.43** (13.43)	47.98 (13.16)	50.52 (13.74)	0.4974	NO

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YOUNGERS

Individual work with students (consultations, conducting study research work, etc.) 10%

Other activities (management, popularization, writing reviews, etc.) 10%

scientific work 35%

preparation of classes 20%

administration 7%

realization of teaching 18%

OLDERS

Individual work with students (consultations, conducting study research work, etc.) 9%

Other activities (management, popularization, writing reviews, etc.) 12%

scientific work 36%

preparation of classes 15%

administration 13%

realization of teaching 15%

Courses in methodology

courses	in total	younger	older
Electronic learning methodology	5 (8.93%)	1 (4.35%)	4 (12.12%)
Methodology of teaching	29 (50.88%)	9 (39.13%)	20 (58.82%)

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CONCLUSION: Around 50% of teachers have experience in Methodology of teaching, with the prevalence of older, but only 9% of them have experience in Electronic learning methodology (once again, the older teachers have prevalence);
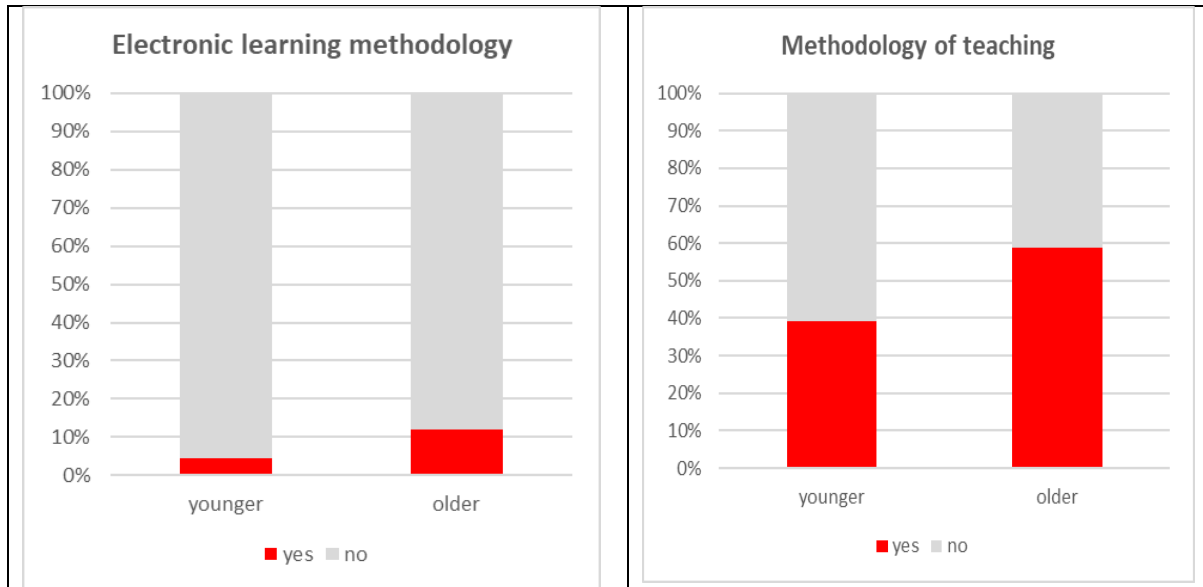
Since only 5 respondents attended the e-learning methodology, in the following table we list which areas were listened to:

Areas	number of respondents
Electronic publishing (Latex, HTML, XML, PDF, etc.)	5=3+2 [1]
Online Technology in Teaching	8=4+4
Open source software (MOODLE, Python, GeoGebra, MOOC, etc.)	5=4+1

[1] We note that there are cases and there are respondents who have declared that they have not been listening to the method of electronic learning but have listened to some of the contents listed in the previous table. The first one is the number of respondents who have attended the method of electronic learning, while the second one is the number of respondents who did not attend

At Question: _Did you give at least one lecture in English. If yes, specify when and where_, less than 1/2, or 26 respondents answered yes.

At Question: _Have you prepared at least one lecture or part of the lecture on the electronic platform. If yes, specify on which platform_ the situation is reversed, 8 respondents answered yes (and they used the Moodle platform or Google Classroom), while most of the respondents (84%) had no experience in this area.

Question	younger	older	IN TOTAL
Have you participated in a professional conference whose emphasis was on applying innovative teaching technologies?	2 (8.70%)	7 (20.59%)	9 (15.79%)
Have you ever discussed with students about the impact of using modern technologies on the quality of teaching and lerning?	14 (60.87%)	16 (48.48%)	30 (53.57%)

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Conclusion: Around 50% of teachers have experience in giving at least one lecture in English, while 84% of them have no experience in using electronic platforms;

Attitudes on the use of ICT in teaching

Respondents answered how much the following claims are true for them on the five-level Lihter scale (1- It's not true at all; 2 - It's not true in general; 3- Equally true and not true; 4 - Generally true. 5. Totally true).

notation	Statements
p1	The use of new technologies in teaching is very important for the quality of the lecture.
p2	Group work, multimedia presentations and modern software capabilities save valuable teachers time.
p3	Student presentations and discussions save time for the teacher.
p4	You want to improve your teaching skills using information technology, because it would help you prepare lessons easier.
p5	You want to improve your teaching skills using information technology, because it will bring you more respect from students.
p6	You want to improve your teaching skills using information technology, because it will bring you more respect from colleagues

	1	2	3	4	5
p1	1	3	13	28	12
p2	3	7	14	22	10
p3	4	13	24	11	5
p4	4	3	13	21	16
p5	15	13	14	9	6
p6	16	15	13	9	4
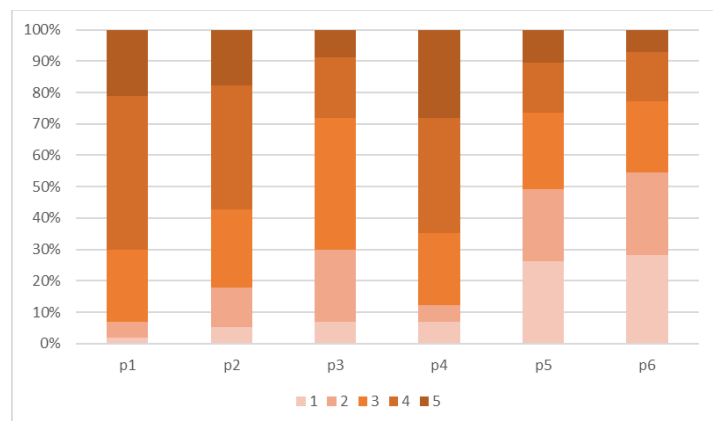
Distribution of the response to the six observed claims

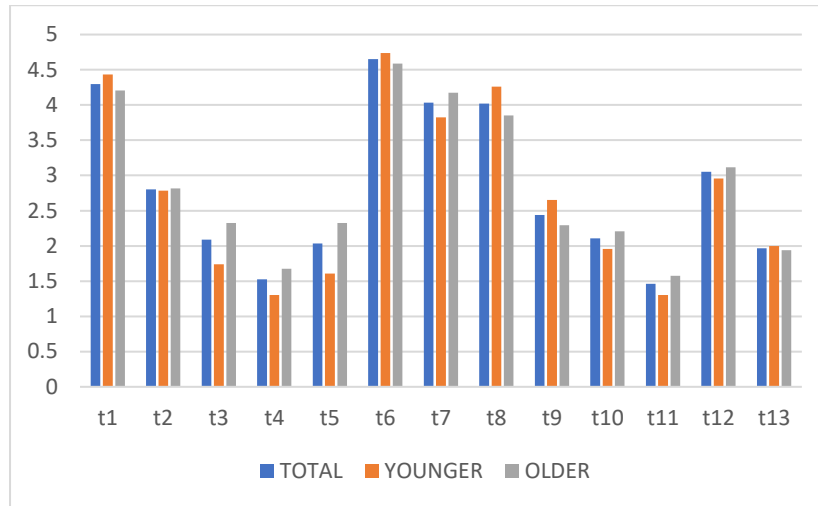| statement	TOTAL			YOUNGER			OLDER		
	mean	median	mode	mean	median	mode	mean	median	mode
p1	**3.825**	4	4	3.957	4	4	3.735	4	4
p2	**3.518**	4	4	3.682	4	4	3.412	4	4
p3	**3**	3	3	3.087	3	3	2.941	3	3
p4	**3.737**	4	4	3.913	4	4	3.618	4	4
p5	**2.614**	3	1	2.696	2	2	2.559	3	3
p6	**2.474**	2	1	2.435	2		2.5	2.5	3

Mean response values of the respondents

CONCLUSION: The majority of teachers agreed that use of new technologies in teaching has clear benefits for quality of the lecture and that group work, multimedia presentations and modern software capabilities may save valuable teachers time. Also, majority of teachers expressed wish to improve their teaching skills by using information technology;

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SELF ASSESSMENTS OF ICT COMPETENCES

Respondents assessed their knowledge of ICT on the five-level Lihter scale (1- Not true 2- not true in general 3- neither not true nor true 4-true in general 5-totally true), indicating in what degree they agreed with the following claims

notation	statement
t1	The level of your knowledge and skills in applying Office software package:
t2	Level of your knowledge and skills in applying Open Source software:
t3	Level of your knowledge and skills in implementing Web conferencing software:
t4	Level of Your Skills and Skills in the Application of Leadership Learning Software (LMS):
t5	The level of your knowledge and skills in applying online learning platform:
t6	Use electronic materials (presentations) as teaching materials.
t7	Use electronic books / textbooks as teaching materials.
t8	Use animations / movies as teaching material.
t9	Use forums and other forms of online communication in teaching and learning.
t10	Use online courses as a teaching material.
t11	Use web conferences as a teaching material.
t12	Use databases in teaching and learning.
t13	You are open to communicating with students via social networks (Facebook, Twitter, etc.).

statement	TOTAL			YOUNGER			OLDER		
	mean	median	mode	mean	median	mode	mean	median	mode
t1	4.30	4	4	4.43	4	4	4.21	4	4
t2	2.80	3	2	2.78	3	3	2.82	2	2
t3	2.09	2	1	1.74	1	1	2.32	2	2
t4	1.53	1	1	1.30	1	1	1.68	1	1
t5	2.04	2	1	1.61	1	1	2.32	2	
t6	4.65	5	5	4.74	5	5	4.59	5	5
t7	4.04	4	5	3.83	4	5	4.18	4.5	5
t8	4.02	4	5	4.26	5	5	3.85	4	5
t9	2.44	2	1	2.65	2	1	2.29	2	1
t10	2.11	2	1	1.96	1	1	2.21	2	1
t11	1.46	1	1	1.30	1	1	1.58	1	1
t12	3.05	3	3	2.96	3	3	3.12	3	
t13	1.96	1	1	2.00	1	1	1.94	1	1

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CONCLUSION: It seems that teachers have a good level of knowledge and skills in applying Office software package, and using electronic materials (presentations, books/textbooks, animations/movies, databases) in teaching. As opposite, they have less knowledge and skills in applying Open Source software, Web conferencing software, Leadership Learning Software (LMS), forums or social networks in teaching, and they rarely organized classes in form of online courses or web conferences;

Can you notice the benefits of applying modern technology in teaching and learning?
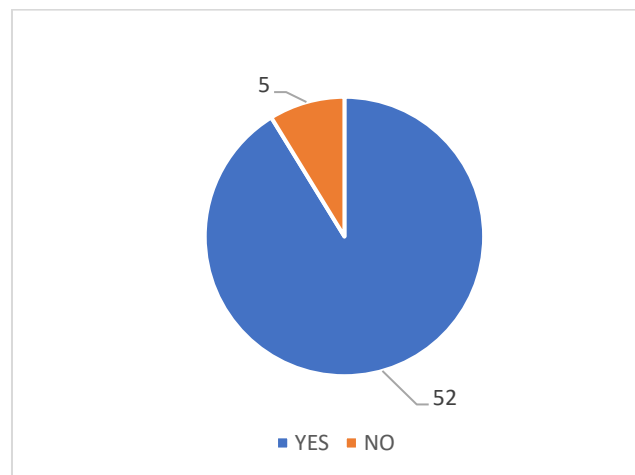
What are these benefits?

Benefit	YES	%
Save time	23	40.35%
It facilitates the preparation of classes	24	42.11%
Increases students' level of interest	40	70.18%
Increases the quality of teaching materials	35	61.40%
It makes learning easier	37	64.91%
Improves communication between teachers and students	31	54.39%

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CONCLUSION: Teachers clearly notice the benefits of applying modern technology in teaching and learning, especially in categories of increasing students' level of interest, increasing the quality of teaching materials, making learning easier and improving communication with students;

Do you use some free online learning platforms for courses? If your answer is YES, please indicate the platforms you are using.
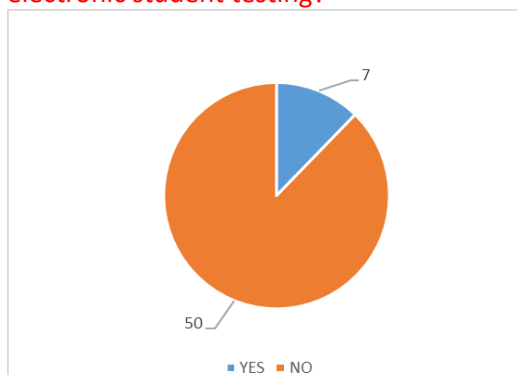
Moodle	2	3.51%
google classroom	6	10.53%
YouTube	1	1.75%
PhysioEx	2	3.51%
Coursera	1	1.75%
No	45	78.95%

CONCLUSION: 70% of teachers have no previous experience with using online platforms in teaching. For the rest of 30% who have, the dominant platform is Google classroom;
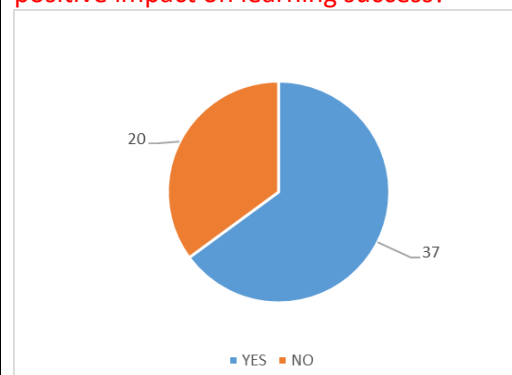
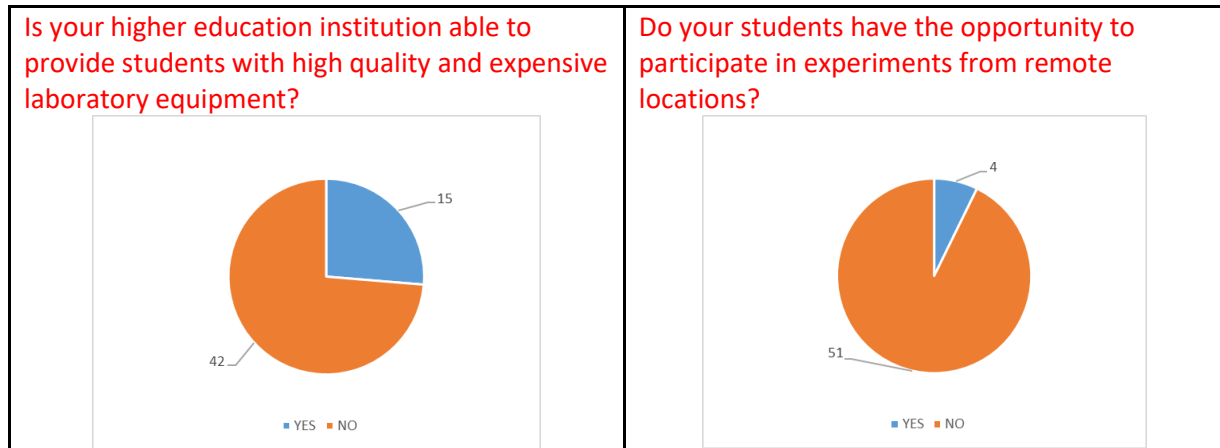Do you think that using the online learning platform can:

	YES	%
Enable students easier and faster access to learning materials	42	73.68%
Enable students easier and faster access to relevant information	35	61.40%
Allow students access to materials at any time	43	75.44%
Contribute to the realization of the active role of students	33	57.89%
Contributes to the individualisation of learning	31	54.39%
Improves communication between teachers and students	26	45.61%

Has your institution developed a system for electronic student testing?

7
50
■ YES ■ NO

Do you think the student self test system has a positive impact on learning success?

20
37
■ YES ■ NO

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Is your higher education institution able to provide students with high quality and expensive laboratory equipment?

15
42

YES NO

Do your students have the opportunity to participate in experiments from remote locations?
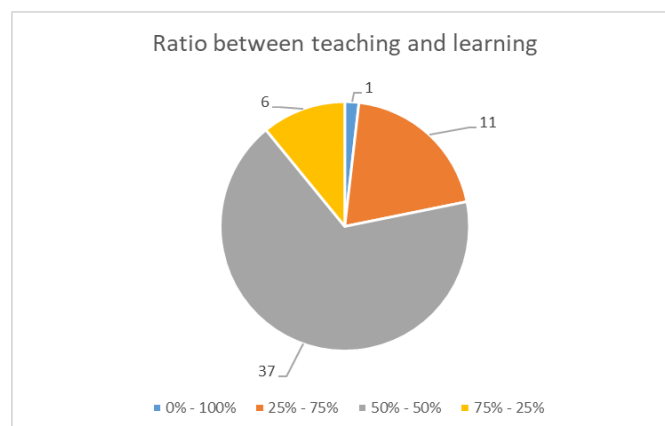

4
51

YES NO

CONCLUSION: Majority of teacher agree that using online learning platform can improve students' competencies, individualization of learning, active role of students and communication between teachers and students

The most important barriers to applying modern teaching technologies in teaching and learning are:

	YES	%
Lack of ICT skills	43	75.44%
Lack of time	18	31.58%
Lack of hardware	28	49.12%
Lack of software	37	64.91%
Inability to access computers	17	29.82%

CONCLUSION: Teachers claim lack of institutional support, like are systems for electronic student testing, high quality and expensive laboratory equipment, or possibility for students to remotely participate in experiments. For the majority of teachers, the main obstacle in using modern technologies is their lack of ICT skills (75%), and lack of software (65%) and hardware (49%)

In your opinion, what ratio (in percent) should be between teaching and learning in education to make education the most successful?

Ratio between teaching and learning

1
11
6
37

0% - 100% 25% - 75% 50% - 50% 75% - 25%

The best ratio between teaching and learning which makes education most successfully is 50:50;

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Pedagogical methods and teaching skills

Level of skills in English

	low	middle	high
Listening	0	16	41
reading	0	13	44
writing	0	29	28
talk	2	28	27

CONCLUSION: Concerning knowledge in English, teachers are better in reading and listening, than writing and speaking;

Have you ever attended a course in one of the listed disciplines during your formal education?
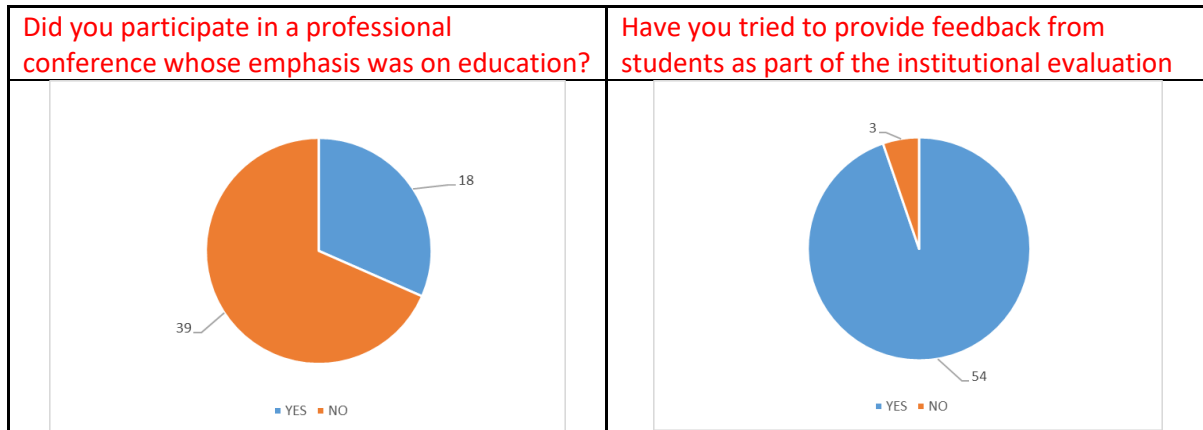
course	Yes	No
Pedagogy	24	32
Psychology	22	33
Teaching methodology	23	32
Application of new technologies in teaching	7	46
English language	43	12
You have not attended a course of any of these disciplines		28

Have you ever held a course or have educated yourself informally (consulting some of the sources: books, articles, online resources, professional organizations, experienced colleagues, mentors, etc.) from one of the above disciplines during your career

course	DA	NE
Pedagogy	9	41
Psychology	13	36
Teaching methodology	19	31
Application of new technologies in teaching	13	35
English	25	24
You have not taught or learned a course of any of these disciplines		25

Do you consider that the teaching skills of university professors are very important for the quality of their classes?

I totally agree	51
I partially agree	6
I do not agree	0

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Did you participate in a professional conference whose emphasis was on education?	Have you tried to provide feedback from students as part of the institutional evaluation
18 39 ■ YES ■ NO	3 54 ■ YES ■ NO

What would motivate you to engage in improving your teaching competencies?

Get more respect from colleagues or students	9	15.79%
Possibility of easier preparation of classes	16	28.07%
Achieve better quality of teaching	49	85.96%
Attracting more students to elective courses	30	52.63%
Getting some financial or material compensation	12	21.05%
You are not interested	4	7.02%

CONCLUSION: The majority of teachers had no experience to be formally or informally educated in PPM or new technologies in teaching;
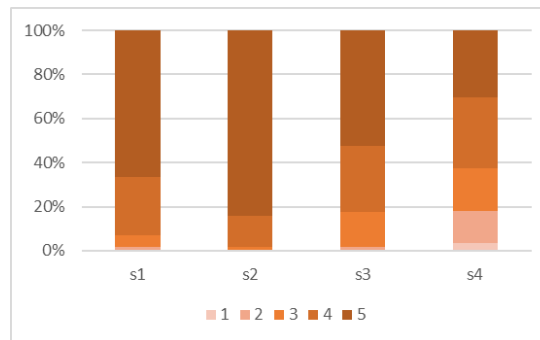
Application of educational strategies, English language and technology in teaching

On the five-level Lihter scale (1- It's not true at all; 2 - It's not true at all; 3- Equally true and not true; 4 - Generally true. 5. Totally true) responded how much the following claims are true for them

Teaching strategies involving students

Notation	Statement
s1	You provide feedback to students about test solutions, tasks, and ongoing work.
s2	You provide clear information to students on how to evaluate the course they attend.
s3	You give students clear instructions on how to prepare for the next hour.
s4	You give students homework, short-term assignments, an obligation to read something or some other form of preparation for the coming time.

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	1	2	3	4	5
s1	0	1	3	15	38
s2	0	0	1	8	48
s3	0	1	9	17	30
s4	2	8	11	18	17

Distribution of the answers to the observed claims

statement	TOTAL			YOUNGER			OLDER		
	mean	median	mod	mean	median	mod	mean	median	mod
s1	4.579	5	5	4.565	5	5	4.588	5	5
s2	4.825	5	5	4.913	5	5	4.765	5	5
s3	4.333	5	5	4.652	5	5	4.118	4	5
s4	3.714	4	4	3.957	4	4	3.545	4	3

Mean response values of the respondents

CONCLUSION: .....

Intellectual engagement and impact on learning

Notation	Statement
a1	You motivate and encourage students to develop new ideas and find creative solutions to problems during learning.
a2	You motivate students to seek more solutions to the same problem and compare them.
a3	Usually, you initiate a discussion on classes, about solving complex problems.
a4	You ask students to explain their ideas.

	1	2	3	4	5
a1	0	1	8	27	21
a2	1	0	9	27	20
a3	0	2	13	20	22
a4	0	0	6	21	30
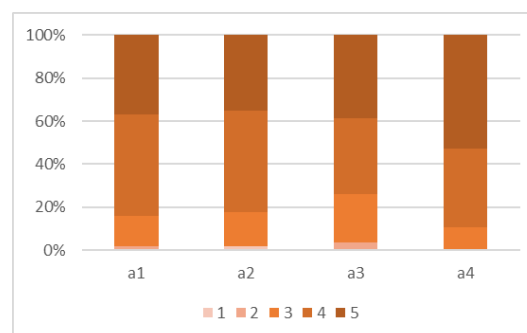
Distribution of the answers to the observed claims

statements	TOTAL			YOUNGER			OLDER		
	mean	median	mod	mean	median	mod	mean	median	mod
a1	4.193	4	4	4.13	4	4	4.235	4	5
a2	4.14	4	4	4.043	4	4	4.206	4	

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a3	4.088	4	5	4.087	4		4.088	4	
a4	4.421	5	5	4.565	5	5	4.324	4	5

Mean response values of the respondents

CONCLUSION: .....
.

Relationship: teacher-student

oznaka	tvrdnja
o1	Students with you communicate openly and freely.
o2	You are open to various forms of electronic communication through social networks (Facebook, Twitter, etc.).
o3	Relate to the students with respect.
o4	You are communicating with students with a smile and a warm and friendly tone.

	1	2	3	4	5
o1	0	0	7	24	26
o2	26	11	8	4	8
o3	0	0	1	5	51
o4	0	0	3	19	34
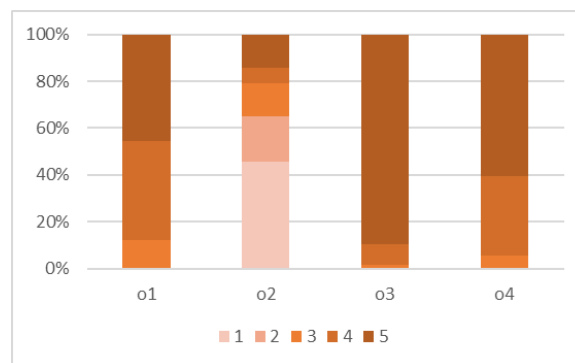
Distribution of the answers to the observed claims

	TOTAL			YOUNGER			OLDER		
statements	mean	median	mod	mean	median	mod	mean	median	mod
o1	4.333	4	5	4.348	4	4	4.324	4	5
o2	2.246	2	1	2.304	2	1	2.206	2	1
o3	4.877	5	5	4.957	5	5	4.824	5	5
o4	4.554	5	5	4.545	5	5	4.559	5	5

Mean response values of the respondents

CONCLUSION: ....

Cooperation

notations	statement
b1	You give students group assignments that they need to finish at class or at home.
b2	You motivate students to share their knowledge and help other students during classes or during the preparation of the exam.
b3	Use collaborative software in communicating with students (Google Docs, Wikis, etc.).

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b4	You expect students to engage in discussion and express their opinion.

	1	2	3	4	5
b1	7	6	14	16	14
b2	3	3	14	19	18
b3	13	12	7	12	13
b4	0	0	3	11	43
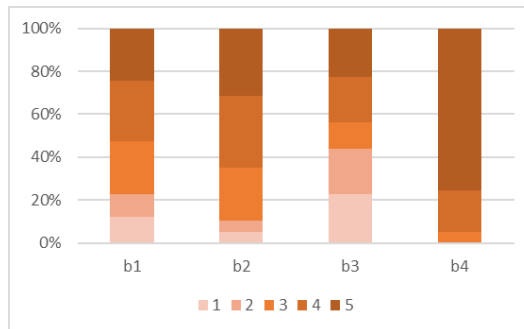
Distribution of the answers to the observed claims

statements	TOTAL			YOUNGER			OLDER		
	mean	median	mod	mean	median	mod	mean	median	mod
b1	3.421	4	4	3.435	4	4	3.412	3	3
b2	3.807	4	4	3.913	4	4	3.735	4	
b3	3	3	1	3.174	3		2.882	2.5	2
b4	4.702	5	5	4.696	5	5	4.706	5	5

Mean response values of the respondents

CONCLUSION: .....

Student-centered teaching and learning

notation	statement
c1	You are ready to make certain changes to the contents of your course, to accommodate it to the needs of students.
c2	You respect the priorities and wishes of the students by giving them individual tasks.
c3	Link the contents of your courses with previous knowledge and experience of students.
c4	You are interested in the opinions of students.

	1	2	3	4	5
c1	0	0	2	20	35
c2	1	6	19	20	11
c3	0	1	3	13	39
c4	0	0	3	5	48
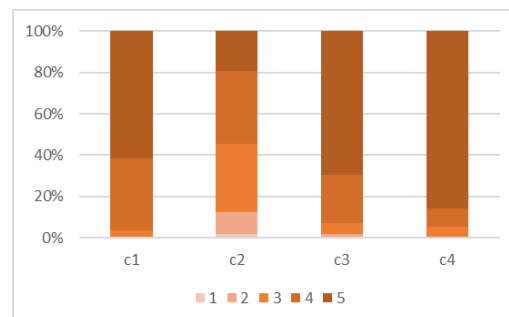
Distribution of the answers to the observed claims

statements	TOTAL			YOUNGER			OLDER		
	mean	median	mod	mean	median	mod	mean	median	mod
c1	4.579	5	5	4.478	5	5	4.647	5	5
c2	3.596	4	4	3.478	4	4	3.676	4	
c3	4.607	5	5	4.522	5	5	4.667	5	5

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c4	4.804	5	5	4.864	5	5	4.765	5	5

Mean response values of the respondents

CONCLUSION: .....

Enthusiasm and way of teaching

Notation	Statement
d1	You change teaching methods to maintain students' interest.
d2	You use electronic books, presentations, video clips, movies, and more. at their classes.
d3	You use work in pairs, group work, workshops and other techniques to improve interaction during classes.
d4	You motivate students to search for new learning resources beyond required materials and critically assess their reliability.

	1	2	3	4	5
d1	0	1	10	24	22
d2	2	0	5	16	34
d3	9	4	13	15	16
d4	2	0	11	22	22
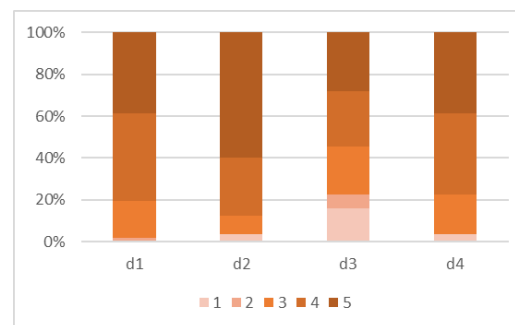
Distribution of the answers to the observed claims

statements	TOTAL			YOUNGER			OLDER		
	mean	median	mod	mean	median	mod	mean	median	mod
d1	4.175	4	4	4.043	4	4	4.265	4	
d2	4.404	5	5	4.261	5	5	4.5	5	5
d3	3.439	4		3.522	4	4	3.382	3.5	5
d4	4.088	4	4	4	4	4	4.147	4	5

Mean response values of the respondents

CONCLUSION: ....

Structure

Notation	Statement
e1	During the lessons you summarize the material and highlight the most important parts.
e2	During the lessons you adjust the time of instruction and manage the time of the organization of the classes well.
e3	Organize and structure teaching materials
e4	You make sure that your classes are well organized.

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	1	2	3	4	5
e1	0	0	2	22	33
e2	0	0	5	21	31
e3	1	0	3	21	31
e4	0	1	1	18	35
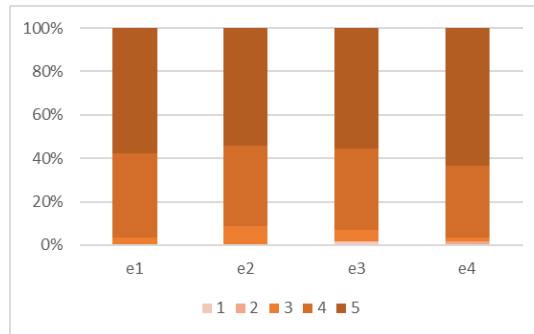
Distribution of the answers to the observed claims

statements	TOTAL			YOUNGER			OLDER		
	mean	median	mod	mean	median	mod	mean	median	mod
e1	4.544	5	5	4.565	5	5	4.529	5	5
e2	4.456	5	5	4.522	5	5	4.412	5	5
e3	4.446	5	5	4.478	5	5	4.424	5	5
e4	4.582	5	5	4.739	5	5	4.469	5	5

Mean response values of the respondents

CONCLUSION: These answers show that there is a both a great need and a space for the development of pedagogical competences among teachers and improvement of their work

Report on the Survey of Teacher Attitudes at the University of Novi Sad

Structure of the sample

The survey was filled in by 30 teachers, 22 of whom were women (73.3%) and 8 men (26.7%). Teachers from six areas were present in the sample in the following way: mathematics (13), geography (6), computer science (4), physics (3), chemistry (2) and biology (2).

The survey was conducted electronically during April 2019.
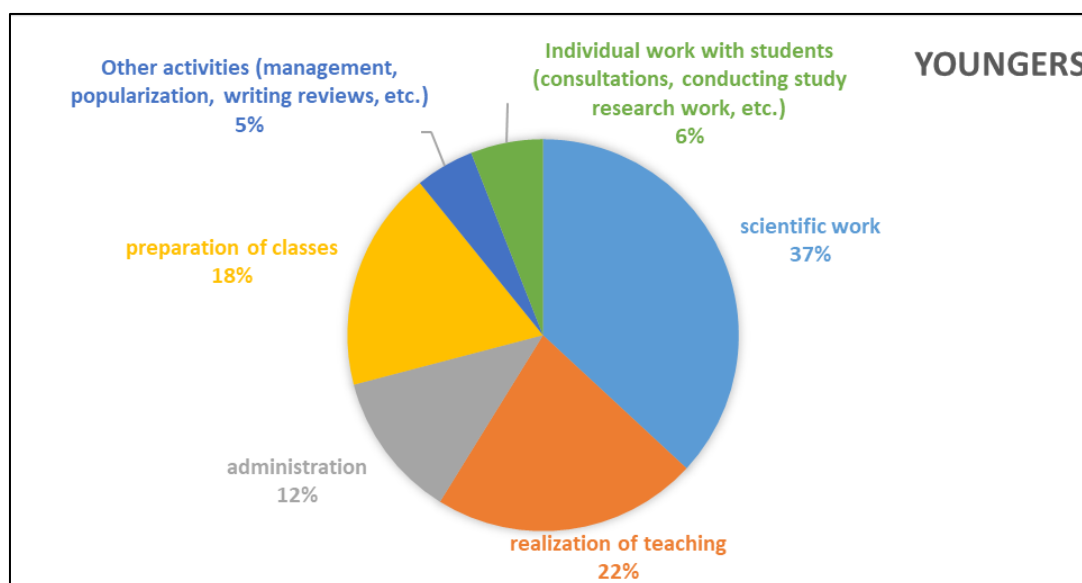
Teaching experience at the university

The average number of years of teaching experience is 12.87 years (the standard deviation is 9.7 years). The shortest teaching experience in the sample is 1 year, while the longest teaching experience is 30 years. In the further report, we will consider teachers and associates whose work experience is up to 12 years under the younger teaching staff, while older teachers will consider teachers with experience over 12 years. Translated to the age of the respondents, we can identify 12 years of experience with 35 years of age.
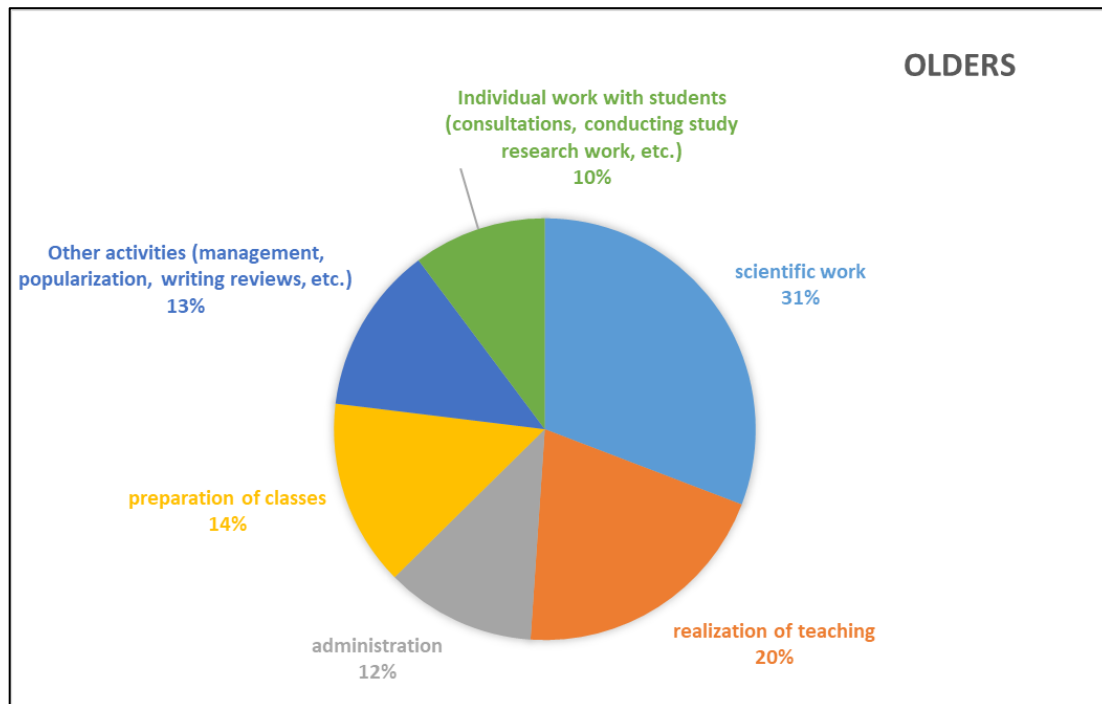
Evaluation of weekly engagement

Work at the university allows for a significant individual distribution of time. For these reasons, teachers / associates filled out how many hours of work were active during the week and how it was arranged. Average respondents said they spend 43.4 hours of work on different activities (with a

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standard deviation of 6.48). operating hours vary from 30 hours to 56 hours. The amount of time spent in the week on individual activities is given in Table 1 and Figure 1.

activity	average number of hours all	average number of hours-youngers	average number of hours - olders	p-value	significance
scientific work	**14.87** (6.11)	16.19 (5.75)	13.36 (6.36)	0.211	NO
realization of teaching	**9.23** (4.23)	9.63 (4.54)	8.79 (3.96)	0.597	NO
administration	**5.17** (4.86)	5.31 (5.99)	5.00 (3.21)	0.867	NO
preparation of classes	**7.17** (4.07)	8.00 (4.62)	6.21 (3.26)	0.238	NO
Other activities (management, popularization, writing reviews, etc.)	**3.79** (2.88)	2.13 (1.25)	5.57 (3.11)	0.0005	**YES**
Individual work with students (consultations, conducting study research work, etc.)	**3.47** (1.89)	2.63 (1.31)	4.43 (2.03)	0.006	**YES**
IN TOTAL	**43.40** (6.48)	43.75 (5.98)	43.00 (7.21)	0.758	NO

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OLDERS

- Individual work with students (consultations, conducting study research work, etc.) 10%
- scientific work 31%
- Other activities (management, popularization, writing reviews, etc.) 13%
- preparation of classes 14%
- administration 12%
- realization of teaching 20%

Courses in methodology

courses	in total	younger	older
Electronic learning methodology	5 (16.67%)	4 (25.00%)	1 (7.14%)
Methodology of teaching	14 (46.67%)	6 (37.50%)	8 (57.14%)

Both courses were attended by 3 teachers, 2 younger and 1 older.
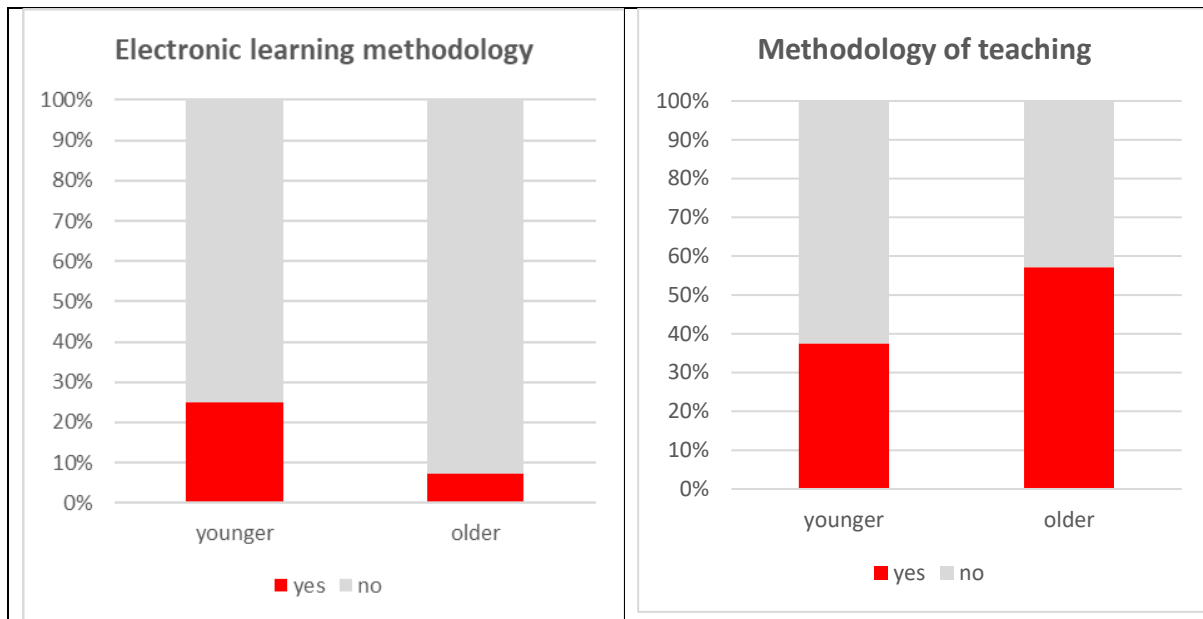
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Electronic learning methodology — Methodology of teaching

Since only 5 respondents attended the e-learning methodology, in the following table we list which areas were listened to:

Areas	number of respondents
Electronic publishing (Latex, HTML, XML, PDF, etc.)	5=4+1[1]
Online Technology in Teaching	3=1+2
Open source software (MOODLE, Python, GeoGebra, MOOC, etc.)	8=4+4

[1] We note that there are cases and there are respondents who have declared that they have not been listening to the method of electronic learning but have listened to some of the contents listed in the previous table. The first one is the number of respondents who have attended the method of electronic learning, while the second one is the number of respondents who did not attend

At Question: _Did you give at least one lecture in English. If yes, specify when and where_, less than 1/3, or 9 respondents, stated that they did not give any lecture, while 21 teachers / associates held a lecture at a foreign university, or at conferences, or realized teaching at PMF in English language. So, it can be concluded that 70% of the respondents had the experience of using English in their profession.

At Question: _Have you prepared at least one lecture or part of the lecture on the electronic platform. If yes, specify on which platform_ the situation is reversed, 9 respondents answered yes (and they used the Moodle platform), while most of the respondents (70%) had no experience in this area. Please note that some teachers / associates listed the use of LATEX tex processors as an electronic platform.

Question	younger	older	IN TOTAL
Have you participated in a professional conference whose emphasis was on applying innovative teaching technologies?	1 (6.67%)	5 (35.71%)	6 (20.69%)
Have you ever discussed with students about the impact of using modern technologies on the quality of teaching and lerning?	6 (37.50%)	8 (57.14%)	14 (46.67%)

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Attitudes on the use of ICT in teaching

Respondents answered how much the following claims are true for them on the five-level Lihter scale (1- It's not true at all; 2 - It's not true in general; 3- Equally true and not true; 4 - Generally true. 5. Totally true).

notation	Statements
p1	The use of new technologies in teaching is very important for the quality of the lecture.
p2	Group work, multimedia presentations and modern software capabilities save valuable teachers time.
p3	Student presentations and discussions save time for the teacher.
p4	You want to improve your teaching skills using information technology, because it would help you prepare lessons easier.
p5	You want to improve your teaching skills using information technology, because it will bring you more respect from students.
p6	You want to improve your teaching skills using information technology, because it will bring you more respect from colleagues

	1	2	3	4	5
p1	1	1	11	9	7
p2	3	2	6	13	5
p3	2	9	12	4	3
p4	2	5	5	10	7
p5	6	7	7	6	4
p6	10	10	6	2	2
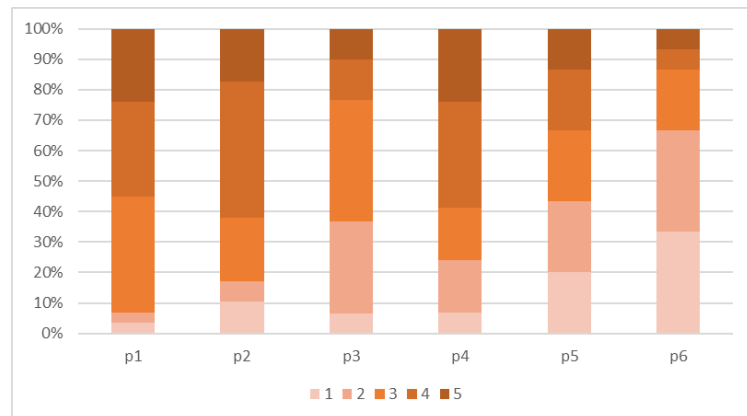
Distribution of the response to the six observed claims

statement	TOTAL			YOUNGER			OLDER		
	mean	median	mode	mean	median	mode	mean	median	mode
p1	**3.69**	4	3	3.667	4	3	3.714	4	3
p2	**3.517**	4	4	3.563	4	4	3.462	4	4
p3	**2.9**	3	3	3	3	3	2.786	2.5	2
p4	**3.517**	4	4	3.188	3	4	3.923	4	4
p5	**2.833**	3		2.625	3	4	3.071	2.5	
p6	**2.2**	2		2	2		2.429	2	

Mean response values of the respondents

CONCLUSION: Respondents gave their opinion on the claims why they want to improve their teaching skills using information technology (claims p4-p6). The results show that the only reason that got the score slightly above 3.5 is that ICT would help make it easier to prepare classes, while greater respect for students (p5) or colleagues (p6) is largely unimportant. It is important to mention that more than
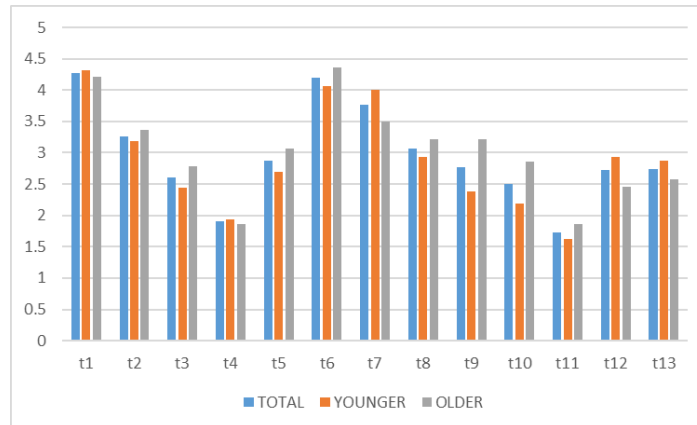
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50% of the respondents pointed out that the use of ICT is important or very important for the quality of teaching.

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SELF ASSESSMENTS OF ICT COMPETENCES

Respondents assessed their knowledge of ICT on the five-level Lihter scale (1- Not true 2- not true in general 3- neither not true nor true 4-true in general 5-totally true), indicating in what degree they agreed with the following claims

| notation	statement
t1	The level of your knowledge and skills in applying Office software package:
t2	Level of your knowledge and skills in applying Open Source software:
t3	Level of your knowledge and skills in implementing Web conferencing software:
t4	Level of Your Skills and Skills in the Application of Leadership Learning Software (LMS):
t5	The level of your knowledge and skills in applying online learning platform:
t6	Use electronic materials (presentations) as teaching materials.
t7	Use electronic books / textbooks as teaching materials.
t8	Use animations / movies as teaching material.
t9	Use forums and other forms of online communication in teaching and learning.
t10	Use online courses as a teaching material.
t11	Use web conferences as a teaching material.
t12	Use databases in teaching and learning.
t13	You are open to communicating with students via social networks (Facebook, Twitter, etc.).

statement	TOTAL			YOUNGER			OLDER		
	mean	median	mode	mean	median	mode	mean	median	mode
t1	4.267	4	4	4.313	4	4	4.214	4	4
t2	3.267	3.5	4	3.188	3	2	3.357	4	4
t3	2.6	2	2	2.438	2	2	2.786	2.5	1
t4	1.9	1	1	1.938	1	1	1.857	1	1
t5	2.867	3	3	2.688	3	3	3.071	3	
t6	4.2	5	5	4.063	5	5	4.357	5	5
t7	3.767	4	5	4	4	5	3.5	4	5
t8	3.067	3	1	2.938	3	1	3.214	3.5	4
t9	2.767	2.5	2	2.375	2	2	3.214	3.5	4
t10	2.5	2	1	2.188	2		2.857	3	1
t11	1.733	1	1	1.625	1	1	1.857	1	1
t12	2.724	3	1	2.938	3	1	2.462	2	1
t13	2.733	2	1	2.875	2.5		2.571	2	1

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CONCLUSION: respondents only assessed their knowledge and skills in applying Office with a high score (4.27), although it is not specified what part of the Office they know. It can be assumed that they know Office, Word, Excel and PowerPoint because the vast majority of respondents answered positively to t6, i.e. to question of using electronic materials. More than half of the respondents said they would use electronic books / textbooks as teaching tools (average score 3.77).

Very rarely respondents use web-based material as a teaching medium (average 1.73), and their knowledge and skills in the application of management software to students are rated negatively (average 1.9).

Can you notice the benefits of applying modern technology in teaching and learning?
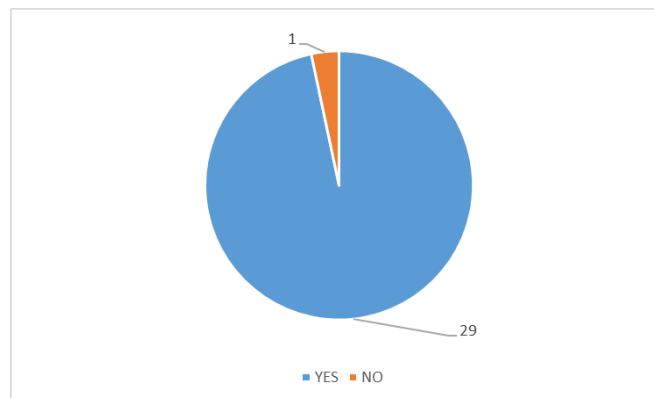
What are these benefits?

Benefit	YES	%
Save time	8	26.7%
It facilitates the preparation of classes	10	33.3%
Increases students' level of interest	20	66.7%
Increases the quality of teaching materials	16	53.3%
It makes learning easier	16	53.3%
Improves communication between teachers and students	20	66.7%

CONCLUSION: Two-thirds of the respondents see benefits from the student's angle because they the most often chosen responses were: *Increases students' level of interest* and *Improves communication between teachers and students*, and as a minimal benefit, respondents chose time-saving.

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Do you use some free online learning platforms for courses? If your answer is YES, please indicate the platforms you are using.

Moodle	11	36.67%
Moodle, ASQ, Protus	1	3.33%
Moodle, Khan Academy	1	3.33%
Ne	17	56.67%

CONCLUSION: Most of the respondents do not use the platform, while Moodle is used by all respondents who worked on platforms.

Do you think that using the online learning platform can:

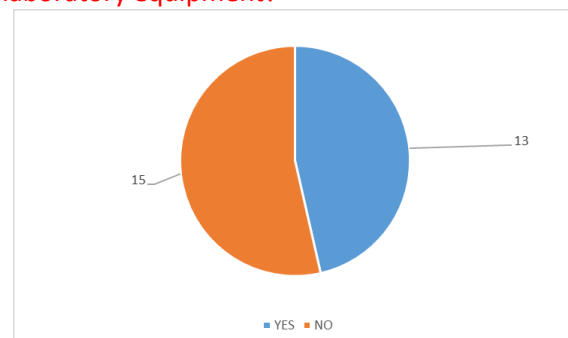|	YES	%
Enable students easier and faster access to learning materials	28	93.3%
Enable students easier and faster access to relevant information	21	70.0%
Allow students access to materials at any time	24	80.0%
Contribute to the realization of the active role of students	10	33.3%
Contributes to the individualisation of learning	10	33.3%
Improves communication between teachers and students	14	46.7%

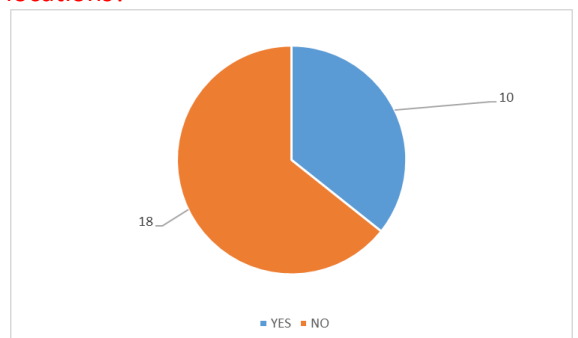Has your institution developed a system for electronic student testing?
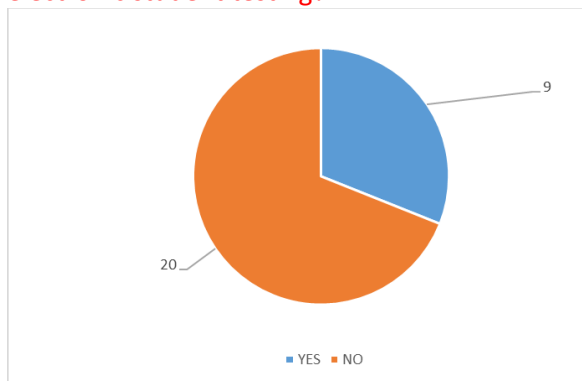
Do you think the student self test system has a positive impact on learning success?
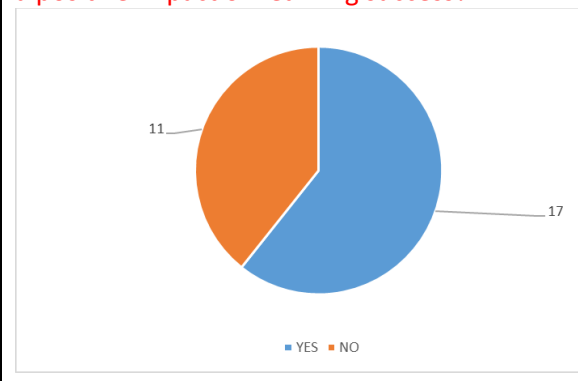
Is your higher education institution able to provide students with high quality and expensive laboratory equipment?

Do your students have the opportunity to participate in experiments from remote locations?

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The most important barriers to applying modern teaching technologies in teaching and learning are:

	YES	%
Lack of ICT skills	19	63.3%
Lack of time	10	33.3%
Lack of hardware	10	33.3%
Lack of software	12	40.0%
Inability to access computers	0	0.0%

CONCLUSION: Two-thirds of respondents see the lack of ICT skills as the most significant obstacle to the application of teaching technologies, while about a third of the respondents state the lack of software or hardware or time as a significant barrier.

In your opinion, what ratio (in percent) should be between teaching and learning in education to make education the most successful?

Ratio between teaching and learning

■ 25% - 75%   ■ 50% - 50%   ■ 75% - 25%
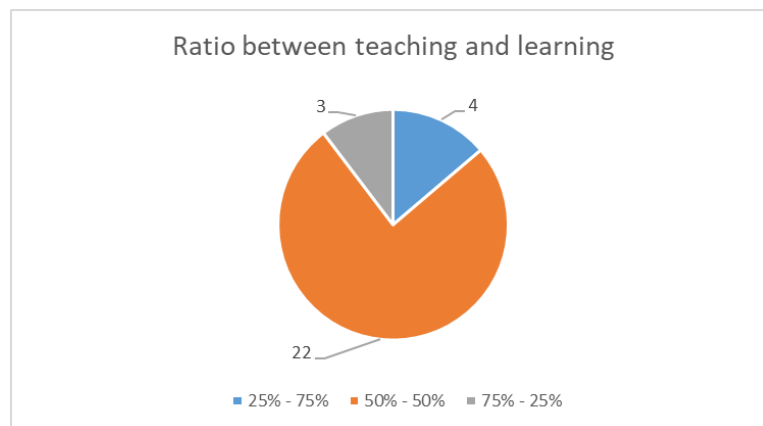
Pedagogical methods and teaching skills

Level of skills in English

	low	middle	high
Listening	0	5	25
reading	0	5	25
writing	0	10	20
talk	0	13	17

CONCLUSION: Unlike the self-assessed knowledge and skills of ICT technologies, respondents estimated the knowledge of English language with high marks.

Have you ever attended a course in one of the listed disciplines during your formal education?

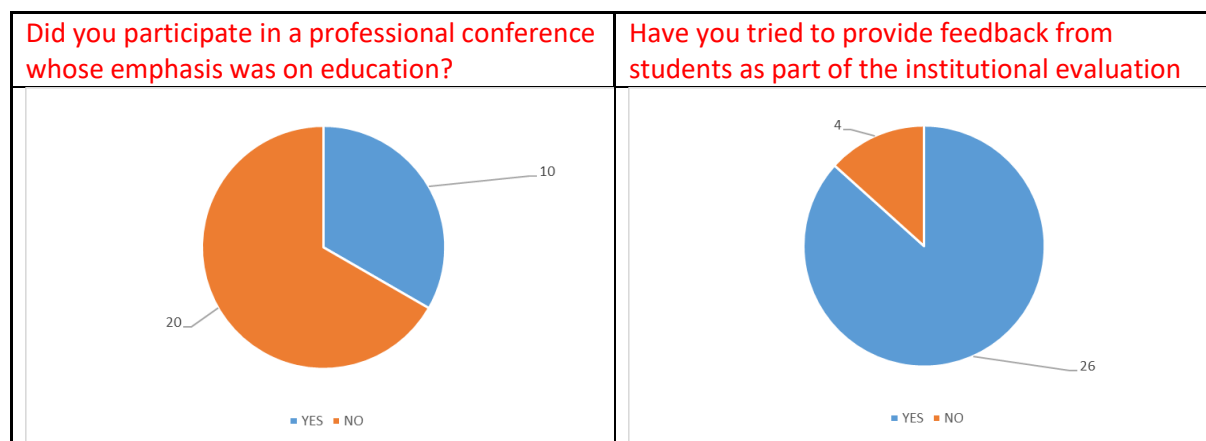| course	Yes	No
Pedagogy	8	21
Psychology	11	18

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Teaching methodology	10	18
Application of new technologies in teaching	4	24
English language	28	2
You have not attended a course of any of these disciplines		15

Have you ever held a course or have educated yourself informally (consulting some of the sources: books, articles, online resources, professional organizations, experienced colleagues, mentors, etc.) from one of the above disciplines during your career

course	DA	NE
Pedagogy	5	23
Psychology	9	19
Teaching methodology	10	18
Application of new technologies in teaching	12	16
English	15	15
You have not taught or learned a course of any of these disciplines	6	13

Do you consider that the teaching skills of university professors are very important for the quality of their classes?

I totally agree	22
I partially agree	8
I do not agree	0

Did you participate in a professional conference whose emphasis was on education?	Have you tried to provide feedback from students as part of the institutional evaluation

What would motivate you to engage in improving your teaching competencies?

Get more respect from colleagues or students	5	16.7%
Possibility of easier preparation of classes	7	23.3%
Achieve better quality of teaching	27	90.0%
Attracting more students to elective courses	15	50.0%
Getting some financial or material compensation	5	16.7%
You are not interested	1	3.3%

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CONCLUSION: The vast majority of the respondents (90%) said that their driving motive would be to achieve better quality of teaching, while very few respondents (5%) would have received some compensation or greater respect as motives.

Application of educational strategies, English language and technology in teaching

On the five-level Lihter scale (1- It's not true at all; 2 - It's not true at all; 3- Equally true and not true; 4 - Generally true. 5. Totally true) responded how much the following claims are true for them

Teaching strategies involving students

Notation	Statement
s1	You provide feedback to students about test solutions, tasks, and ongoing work.
s2	You provide clear information to students on how to evaluate the course they attend.
s3	You give students clear instructions on how to prepare for the next hour.
s4	You give students homework, short-term assignments, an obligation to read something or some other form of preparation for the coming time.

	1	2	3	4	5
s1	1	1	0	10	18
s2	0	0	0	4	26
s3	0	3	6	10	11
s4	1	2	10	7	10
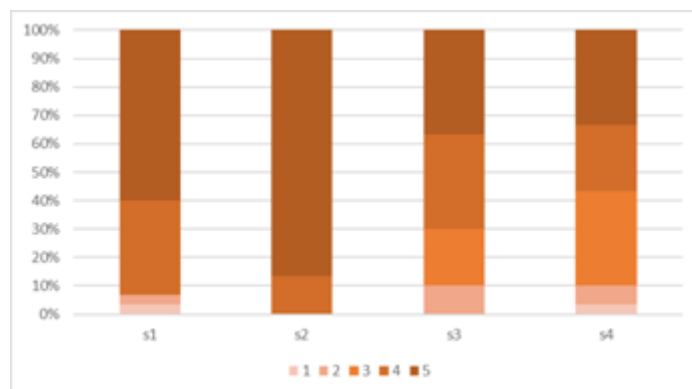
Distribution of the answers to the observed claims

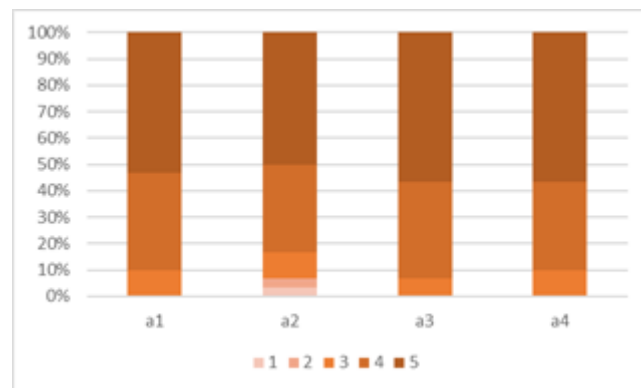| statement	TOTAL			YOUNGER			OLDER		
	mean	median	mod	mean	median	mod	mean	median	mod
s1	4.433	5	5	4.438	5	5	4.429	5	5
s2	4.867	5	5	4.875	5	5	4.857	5	5
s3	3.967	4		3.813	4	4	4.143	4	
s4	3.767	4	3	3.563	3.5	3	4	4.5	5

Mean response values of the respondents

CONCLUSION: All respondents highly assessed the truthfulness of all claims related to strategies involving students. This particularly applies to the statement s2. The weakest in this group is the truthfulness of the claim s4 (you give homework to students, short-term borrowings, the obligation to read something, or some other form of preparation for the next class). It can be noted that older teachers often give homework, while younger ones often give clear instructions for the next class.

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Intellectual engagement and impact on learning

Notation	Statement
a1	You motivate and encourage students to develop new ideas and find creative solutions to problems during learning.
a2	You motivate students to seek more solutions to the same problem and compare them.
a3	Usually, you initiate a discussion on classes, about solving complex problems.
a4	You ask students to explain their ideas.

	1	2	3	4	5
a1	0	0	3	11	16
a2	1	1	3	10	15
a3	0	0	2	11	17
a4	0	0	3	10	17

Distribution of the answers to the observed claims

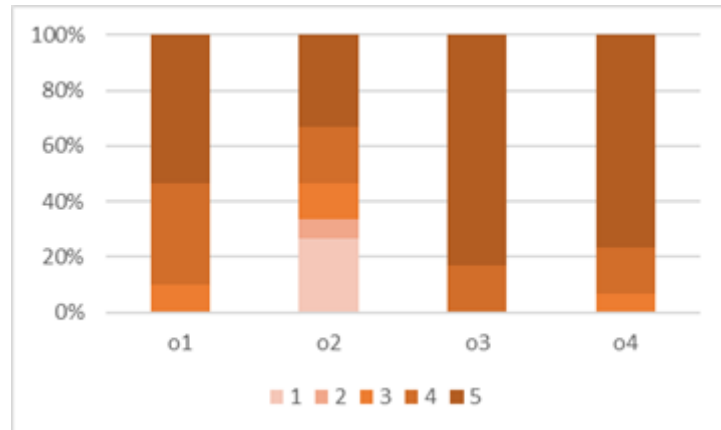| statements	TOTAL			YOUNGER			OLDER		
	mean	median	mod	mean	median	mod	mean	median	mod
a1	4.433	5	5	4.563	5	5	4.286	4	4
a2	4.233	4.5	5	4.438	5	5	4	4	
a3	4.5	5	5	4.688	5	5	4.286	4	4
a4	4.467	5	5	4.688	5	5	4.214	4	

Mean response values of the respondents

CONCLUSION: The respondents rated all the claims from this group with an extremely high grade, i.e., they fully agree with all four claims. However, younger respondents more often stated that the claims were quite correct, while the older ones chose the option to be generally correct. In other words, the younger ones evaluated all the claims more strongly for one grade.

Relationship: teacher-student

oznaka	tvrdnja
o1	Students with you communicate openly and freely.
o2	You are open to various forms of electronic communication through social networks (Facebook, Twitter, etc.).
o3	Relate to the students with respect.
o4	You are communicating with students with a smile and a warm and friendly tone.

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	1	2	3	4	5
o1	0	0	3	11	16
o2	8	2	4	6	10
o3	0	0	0	5	25
o4	0	0	2	5	23

Distribution of the answers to the observed claims

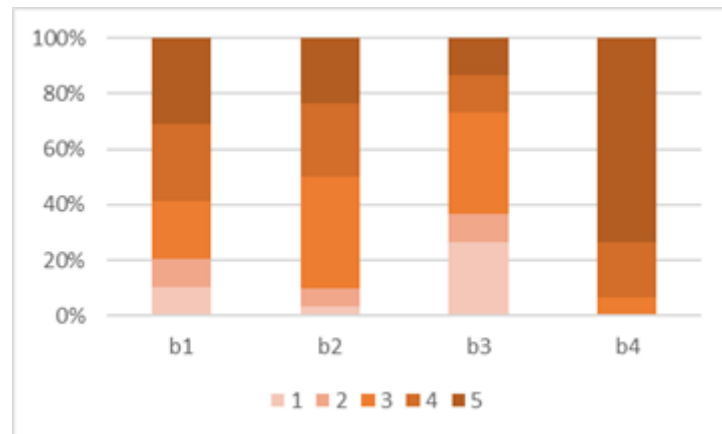| statements	TOTAL			YOUNGER			OLDER		
	mean	median	mod	mean	median	mod	mean	median	mod
o1	4.433	5	5	4.5	4.5	4	4.357	5	5
o2	3.267	4	5	3.438	4	4	3.071	3.5	1
o3	4.833	5	5	4.813	5	5	4.857	5	5
o4	4.7	5	5	4.875	5	5	4.5	5	5

Mean response values of the respondents

CONCLUSION: Respondents highly assessed their relationship with students, stating that they are almost or completely correct to communicate with students openly and freely (o1), to respect communicate with students with respect (o3) and to welcome students with a smile and friendly tone (o4). Their only openness for various forms of electronic communication (o2) was considerably weaker.

Cooperation

notations	statement
b1	You give students group assignments that they need to finish at class or at home.
b2	You motivate students to share their knowledge and help other students during classes or during the preparation of the exam.
b3	Use collaborative software in communicating with students (Google Docs, Wikis, etc.).
b4	You expect students to engage in discussion and express their opinion.

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	1	2	3	4	5
b1	3	3	6	8	9
b2	1	2	12	8	7
b3	8	3	11	4	4
b4	0	0	2	6	22

Distribution of the answers to the observed claims

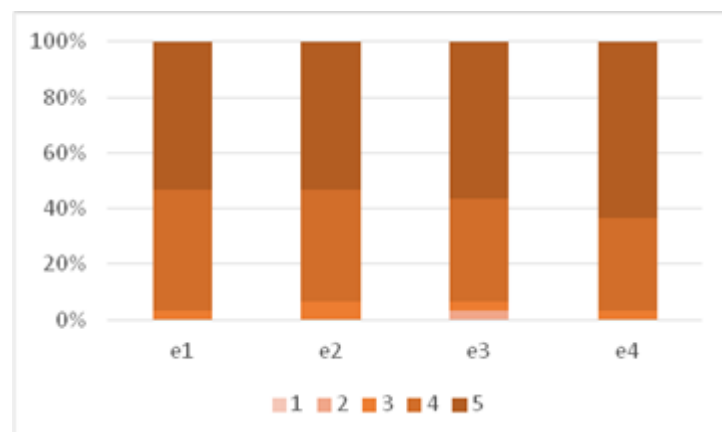| statements	TOTAL			YOUNGER			OLDER		
	mean	median	mod	mean	median	mod	mean	median	mod
b1	3.586	4		3.5	3.5		3.692	4	4
b2	3.621	4	3	3.625	4		3.615	3	3
b3	2.828	3	3	3	3	3	2.615	3	1
b4	4.655	5	5	4.75	5	5	4.538	5	5

Mean response values of the respondents

CONCLUSION: In the group of claims on cooperation, the weakest assessment is the claim b3, i.e. respondents are very poorly using collaborative software. In the group of elderly respondents, most of them chose option 1 (not at all true), which indicates that older respondents are almost not using collaborative software. On the other hand, all respondents expect students to get involved in the discussion and express their opinion (average 4.65).

Student-centered teaching and learning

notation	statement
c1	You are ready to make certain changes to the contents of your course, to accommodate it to the needs of students.
c2	You respect the priorities and wishes of the students by giving them individual tasks.
c3	Link the contents of your courses with previous knowledge and experience of students.
c4	You are interested in the opinions of students.

	1	2	3	4	5
c1	0	0	2	12	16
c2	0	4	8	8	10
c3	0	0	3	9	18
c4	0	0	0	8	22

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Distribution of the answers to the observed claims

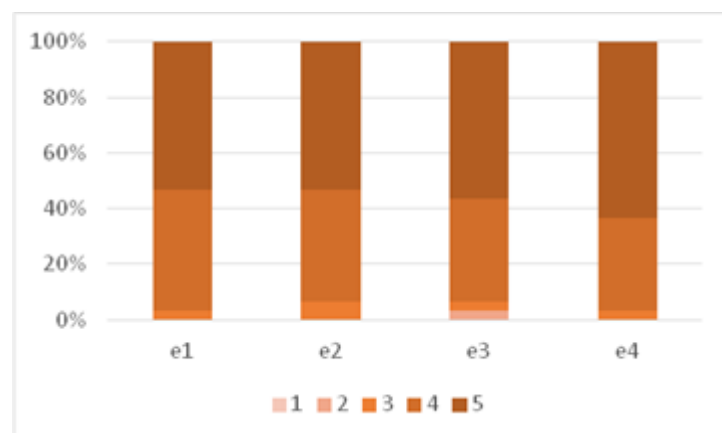| statements	TOTAL			YOUNGER			OLDER		
	mean	median	mod	mean	median	mod	mean	median	mod
c1	4.467	5	5	4.563	5	5	4.357	4	4
c2	3.8	4	5	3.813	4	4	3.786	4	
c3	4.5	5	5	4.438	5	5	4.571	5	5
c4	4.733	5	5	4.75	5	5	4.714	5	5

Mean response values of the respondents

CONCLUSION: In the group of assertions on teaching and learning directed at students, the respondents rated the most, that is, they fully consider the truth of c4 (*You are interested in the opinion of students*). The least agreement was found with the claim c2.

Enthusiasm and way of teaching

Notation	Statement
d1	You change teaching methods to maintain students' interest.
d2	You use electronic books, presentations, video clips, movies, and more. at their classes.
d3	You use work in pairs, group work, workshops and other techniques to improve interaction during classes.
d4	You motivate students to search for new learning resources beyond required materials and critically assess their reliability.

	1	2	3	4	5
d1	0	1	2	15	12
d2	2	1	4	9	14
d3	6	4	5	10	5
d4	0	1	6	11	12

Distribution of the answers to the observed claims

statements	TOTAL			YOUNGER			OLDER		
	mean	median	mod	mean	median	mod	mean	median	mod
d1	4.267	4	4	4.25	4	4	4.286	4	4
d2	4.067	4	5	3.938	4	5	4.214	4.5	5
d3	3.133	3.5	4	3	3	4	3.286	4	4
d4	4.133	4		3.938	4	4	4.357	5	5

Mean response values of the respondents

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CONCLUSION: The smallest agreement is observed with the statement d3 that refers to the work in pairs or group work ... which is probably the consequence or lack of time or lack of conditions (a large number of students). Significant agreement (4.27) respondents showed with the assertion that they changed teaching methods to maintain students' interest. However, the answers to these two questions are to a certain extent inconsistent.

Structure

Notation	Statement
e1	During the lessons you summarize the material and highlight the most important parts.
e2	During the lessons you adjust the time of instruction and manage the time of the organization of the classes well.
e3	Organize and structure teaching materials
e4	You make sure that your classes are well organized.

	1	2	3	4	5
e1	0	0	1	13	16
e2	0	0	2	12	16
e3	0	1	1	11	17
e4	0	0	1	10	19
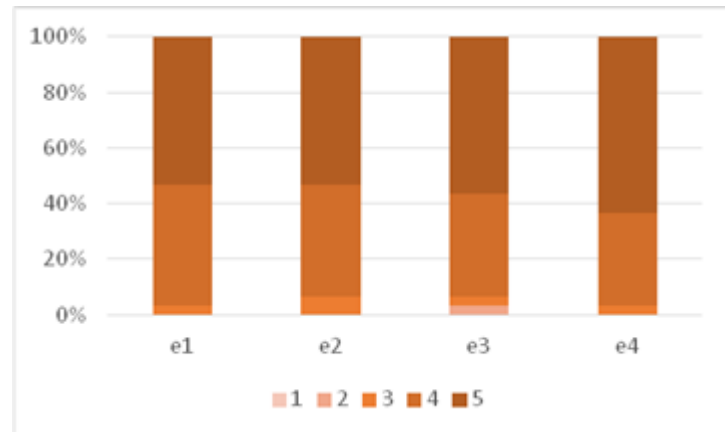
Distribution of the answers to the observed claims

statements	TOTAL			YOUNGER			OLDER		
	mean	median	mod	mean	median	mod	mean	median	mod
e1	4.5	5	5	4.438	4	4	4.571	5	5
e2	4.467	5	5	4.5	5	5	4.429	4.5	
e3	4.467	5	5	4.5	5	5	4.429	5	5
e4	4.6	5	5	4.625	5	5	4.571	5	5

Mean response values of the respondents

CONCLUSION: All the claims concerning the structure are rated very high, that is, the responders consider almost all of the above claims almost or completely true.

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Report on the Survey of Teacher Attitudes at the University of Kragujevac

Structure of the sample

The survey was filled in by 47 teachers, 29 (65.91%) of whom were women and 15 (34.09%) men. Teachers from five areas were present in the sample in the following way: mathematics (8), computer science (4), physics (10), chemistry (13) and biology (11).

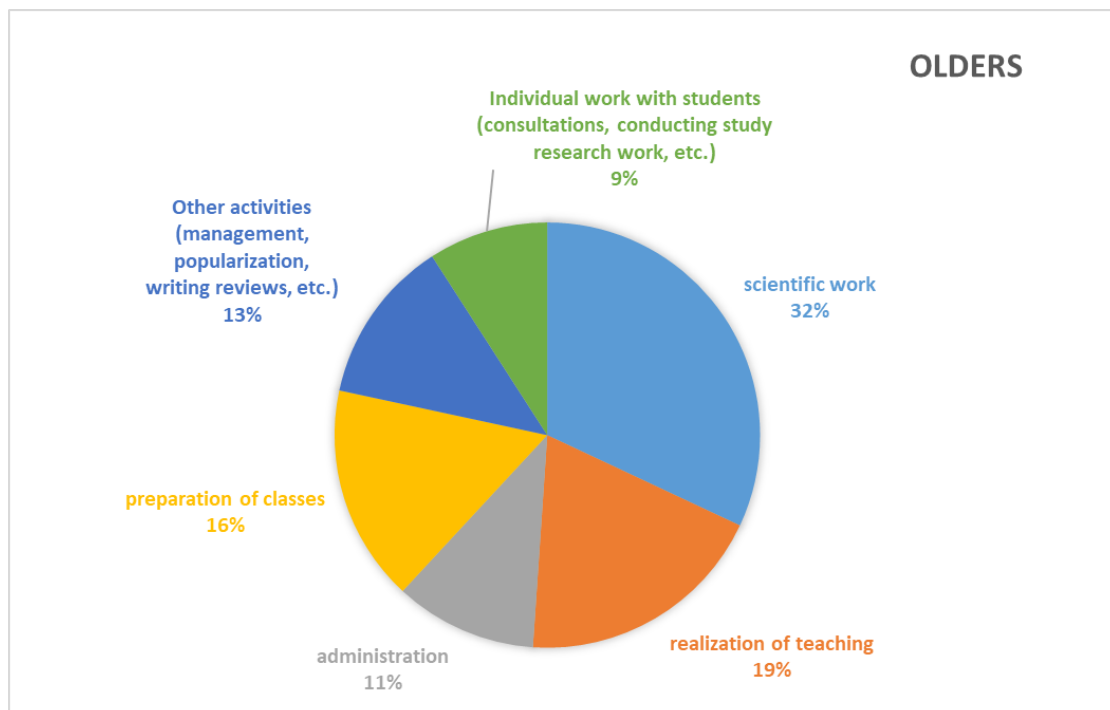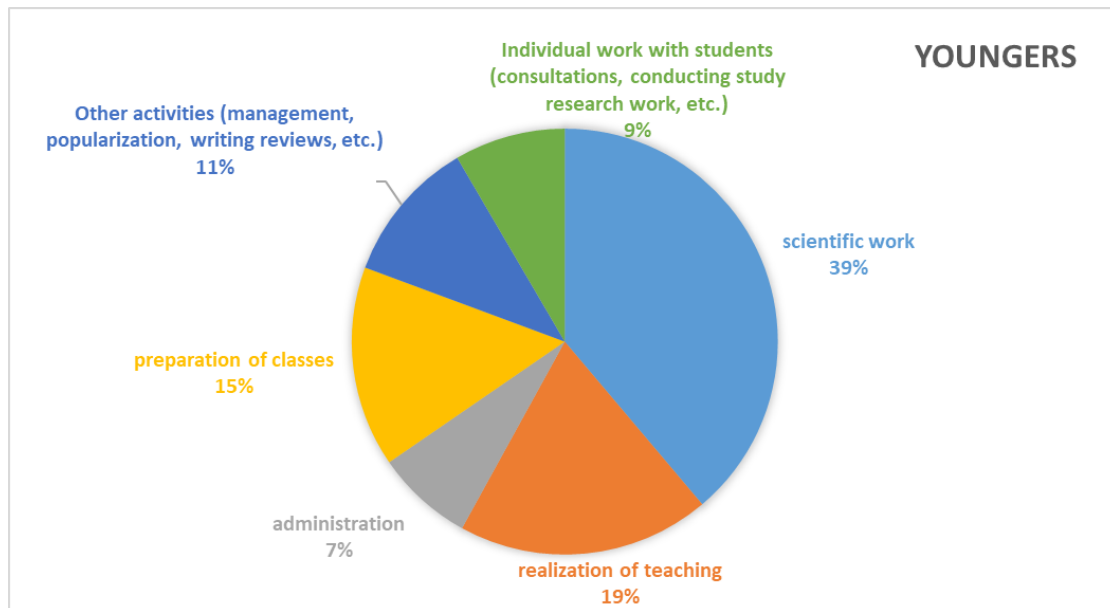The survey was conducted electronically during April 2019.

Teaching experience at the university

The average number of years of teaching experience is 15.69 years (the standard deviation is 11.33 years). The shortest teaching experience in the sample is 1 year, while the longest teaching experience is 40 years. In the further report, we will consider teachers and associates whose work experience is up to 12 years under the younger teaching staff, while older teachers will consider teachers with experience over 12 years. Translated to the age of the respondents, we can identify 12 years of experience with 35 years of age.

Evaluation of weekly engagement

Work at the university allows for a significant individual distribution of time. For these reasons, teachers / associates filled out how many hours of work were active during the week and how it was arranged. Average respondents said they spend 43.72 hours of work on different activities (with a standard deviation of 17.45). operating hours vary from 8 hours to 89 hours. The amount of time spent in the week on individual activities is given in Table 1 and Figure 1.

activity	average number of hours all	average number of hours- youngers	average number of hours - olders	p-value	significance
scientific work	**15.36** (7.08)	16.00 (7.62)	14.79 (6.69)	0.320	NO
realization of teaching	**8.40** (4.79)	7.90 (4.88)	8.83 (4.78)	0.410	NO
administration	**4.09** (4.79)	3.05 (3.41)	5.00 (5.65)	0.175	NO
preparation of classes	**7.00** (4.49)	6.28 (3.61)	7.62 (5.14)	0.324	NO
Other activities (management, popularization, writing reviews, etc.)	**5.20** (5.01)	4.50 (3.80)	5.79 (5.84)	0.400	NO
Individual work with students (consultations, conducting study research work, etc.)	**3.88** (2.88)	3.47 (2.38)	4.21 (3.26)	0.407	NO
IN TOTAL	**43.72** (17.45)	40.83 (16.65)	46.25 (18.09)	0.304	NO

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YOUNGERS

Individual work with students
(consultations, conducting study
research work, etc.)
9%

Other activities (management,
popularization, writing reviews, etc.)
11%

scientific work
39%

preparation of classes
15%

administration
7%

realization of teaching
19%

OLDERS

Individual work with students
(consultations, conducting study
research work, etc.)
9%

Other activities
(management,
popularization,
writing reviews, etc.)
13%

scientific work
32%

preparation of classes
16%

administration
11%

realization of teaching
19%

Courses in methodology

courses	in total	younger	older
Electronic learning methodology	9 (19.15%)	7 (31.82%)	2 (8.00%)

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Methodology of teaching	30 (63.83%)	13 (59.09%)	17 (68.00%)
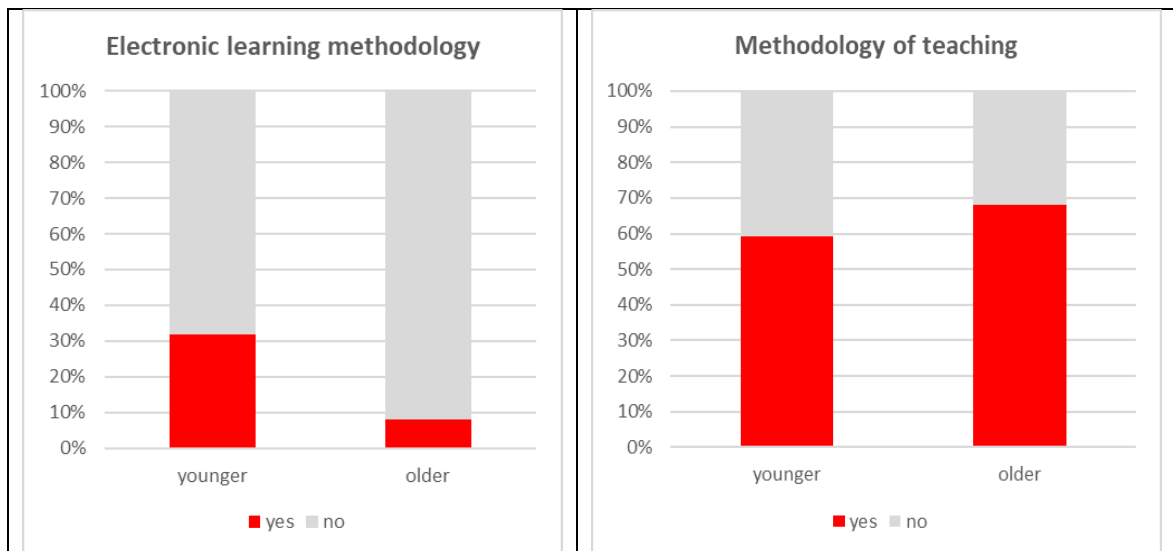
Since 9 respondents attended the e-learning methodology, in the following table we list which areas were listened to:

Areas	number of respondents
Electronic publishing (Latex, HTML, XML, PDF, etc.)	10=5+5 [1]
Online Technology in Teaching	5=2+3
Open source software (MOODLE, Python, GeoGebra, MOOC, etc.)	13=9+4

[1] We note that there are cases and there are respondents who have declared that they have not been listening to the method of electronic learning but have listened to some of the contents listed in the previous table. The first one is the number of respondents who have attended the method of electronic learning, while the second one is the number of respondents who did not attend

At Question: _Did you give at least one lecture in English. If yes, specify when and where_, less than 40%, or 18 respondents answered yes.

At Question: _Have you prepared at least one lecture or part of the lecture on the electronic platform. If yes, specify on which platform_ 11 respondents answered yes (and they used the Moodle platform, Office Impress, but 8 respondents said "Power Point"!?).

Question	younger	older	IN TOTAL
Have you participated in a professional conference whose emphasis was on applying innovative teaching technologies?	4 (18.18%)	5 (20.00%)	9 (19.15%)

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Have you ever discussed with students about the impact of using modern technologies on the quality of teaching and learning?	16 (72.73%)	20 (80.00%)	36 (76.60%)

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Attitudes on the use of ICT in teaching

Respondents answered how much the following claims are true for them on the five-level Lihter scale (1- It's not true at all; 2 - It's not true in general; 3- Equally true and not true; 4 - Generally true. 5. Totally true).

notation	Statements
p1	The use of new technologies in teaching is very important for the quality of the lecture.
p2	Group work, multimedia presentations and modern software capabilities save valuable teachers time.
p3	Student presentations and discussions save time for the teacher.
p4	You want to improve your teaching skills using information technology, because it would help you prepare lessons easier.
p5	You want to improve your teaching skills using information technology, because it will bring you more respect from students.
p6	You want to improve your teaching skills using information technology, because it will bring you more respect from colleagues

	1	2	3	4	5
p1	0	3	12	24	8
p2	0	9	12	16	9
p3	1	6	20	15	4
p4	1	6	5	20	13
p5	6	10	11	13	7
p6	11	15	8	6	7
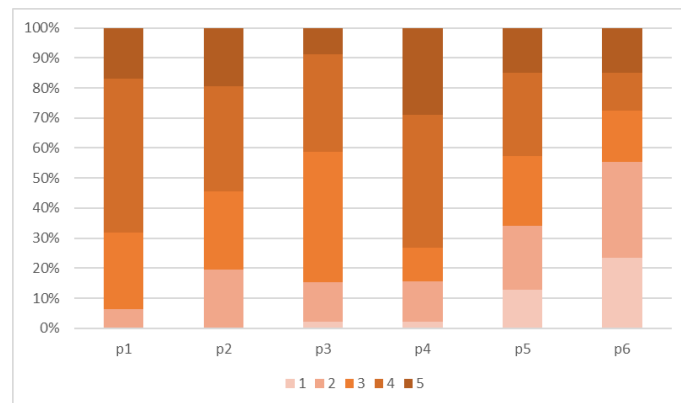
Distribution of the response to the six observed claims

statement	TOTAL			YOUNGER			OLDER		
	mean	median	mode	mean	median	mode	mean	median	mode
p1	3.787	4	4	3.864	4	4	3.72	4	4
p2	3.543	4	4	3.524	4	4	3.56	4	
p3	3.326	3	3	3.318	3	3	3.333	3.5	4
p4	3.844	4	4	3.714	4		3.958	4	4
p5	3.106	3	4	3	3	4	3.2	3	4
p6	2.638	2	2	2.636	2		2.64	2	2

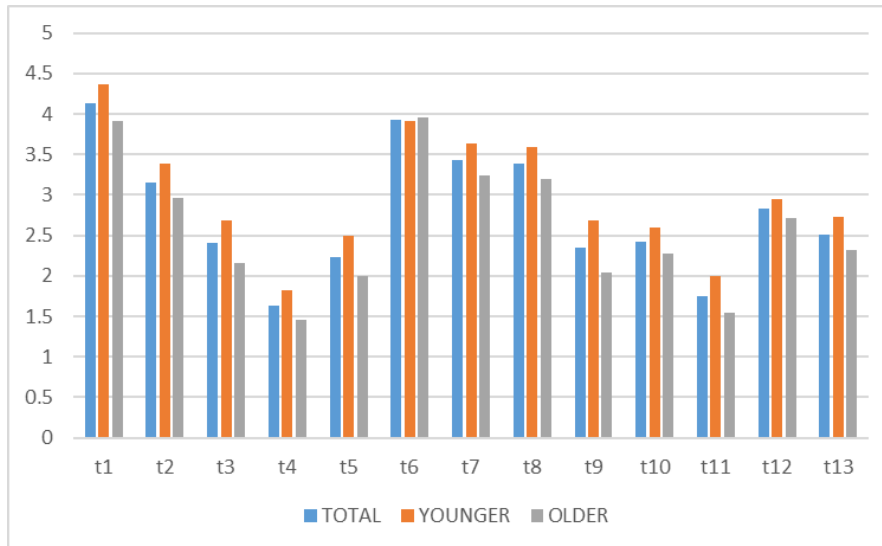Mean response values of the respondents

CONCLUSION: The teachers' responses indicate that they have a positive attitude towards the use of ICT in teaching. They are open for improving their ICT skills (the average for p4 is the highest, 3.844), and at the same time they consider ICT to be very important for the quality of teaching (the average for question p1 is 3.787). Notice that the answers of young and older teachers are pretty much the same.

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SELF ASSESSMENTS OF ICT COMPETENCES

Respondents assessed their knowledge of ICT on the five-level Lihter scale (1- Not true 2- not true in general 3- neither not true nor true 4-true in general 5-totally true), indicating in what degree they agreed with the following claims
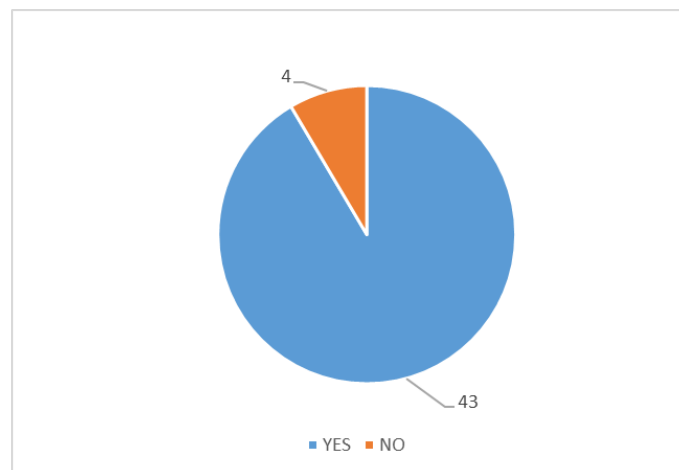
notation	statement
t1	The level of your knowledge and skills in applying Office software package:
t2	Level of your knowledge and skills in applying Open Source software:
t3	Level of your knowledge and skills in implementing Web conferencing software:
t4	Level of Your Skills and Skills in the Application of Leadership Learning Software (LMS):
t5	The level of your knowledge and skills in applying online learning platform:
t6	Use electronic materials (presentations) as teaching materials.
t7	Use electronic books / textbooks as teaching materials.
t8	Use animations / movies as teaching material.
t9	Use forums and other forms of online communication in teaching and learning.
t10	Use online courses as a teaching material.
t11	Use web conferences as a teaching material.
t12	Use databases in teaching and learning.
t13	You are open to communicating with students via social networks (Facebook, Twitter, etc.).

statement	TOTAL			YOUNGER			OLDER		
	mean	median	mode	mean	median	mode	mean	median	mode
t1	4.13	4	4	4.36	4	4	3.92	4	4
t2	3.16	3	4	3.38	4	4	2.96	3	
t3	2.40	2	2	2.68	2	2	2.16	2	1
t4	1.63	1	1	1.82	1	1	1.46	1	1
t5	2.23	2	1	2.50	3	3	2.00	2	2
t6	3.93	4	5	3.91	4	5	3.96	4.5	5
t7	3.43	4	5	3.64	4	5	3.24	3	3
t8	3.38	4	5	3.59	4		3.20	3	
t9	2.35	2	1	2.68	2.5	1	2.04	2	1
t10	2.43	2	1	2.59	2	2	2.28	2	1
t11	1.76	1	1	2.00	2	1	1.54	1	1
t12	2.83	3	3	2.95	3	3	2.71	3	3
t13	2.51	2	1	2.73	2	1	2.32	2	1

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CONCLUSION: Teachers have the highest confidence in their knowledge and skills related to the Office software package (the average for question p1 is 4.13), the use of electronic materials (presentations), electronic books and films as teaching material (averages for question p6, p7 and p8 are 3.93, 3.43, 3.38), as well as knowledge and skills related to using Open Source software (the average for question p1 is 3.16). For all other questions, the average is less than 3, which indicates that there is a significant space for improving the ICT skills of teachers. Older teachers generally assessed their ICT competences less well.

Can you notice the benefits of applying modern technology in teaching and learning?

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What are these benefits?

Benefit	YES	%
Save time	24	51.06%
It facilitates the preparation of classes	22	46.81%
Increases students' level of interest	33	70.21%
Increases the quality of teaching materials	27	57.45%
It makes learning easier	23	48.94%
Improves communication between teachers and students	22	46.81%

CONCLUSION: Even more than 90% of teachers notice the benefits of using ICT in the teaching and learning, and as the most important advantage (70.21%) of this kind of teaching and learning they consider increasing student interest in the subject matter. Probably, this teacher perspective has strong influence on positive attitude of teachers towards improving their knowledge and skills in the use of ICT in the teaching process, which we already noticed.
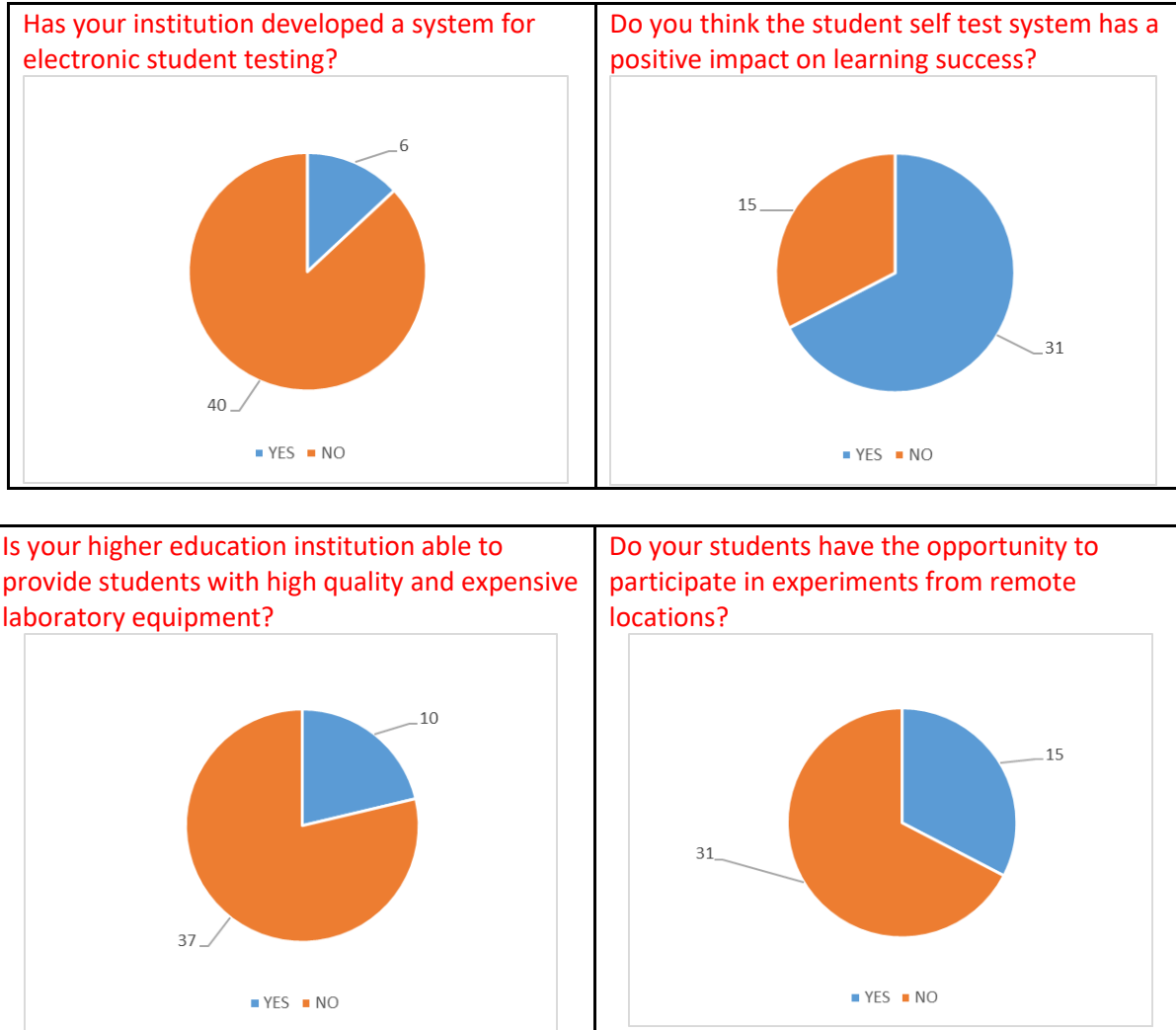
Do you use some free online learning platforms for courses? If your answer is YES, please indicate the platforms you are using.

Moodle	3	6.38%
Geogebra	2	4.25%
Wolfram Mathematica	1	2.12%
google classroom	1	2.12%
No	38	87.23%

CONCLUSION: Unfortunately, only rare among teachers, less than 10% of them, use free online learning platforms. So, these activities of teachers need to be specially promoted and supported in order to be improved.

Do you think that using the online learning platform can:

|	YES	%
Enable students easier and faster access to learning materials	39	82.98%
Enable students easier and faster access to relevant information	24	51.06%
Allow students access to materials at any time	33	70.21%
Contribute to the realization of the active role of students	18	38.30%
Contributes to the individualisation of learning	23	48.94%
Improves communication between teachers and students	17	36.17%

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Has your institution developed a system for electronic student testing?

6	
40	

YES ■ NO

Do you think the student self test system has a positive impact on learning success?

15	
31	

YES ■ NO

Is your higher education institution able to provide students with high quality and expensive laboratory equipment?

10	
37	

YES ■ NO

Do your students have the opportunity to participate in experiments from remote locations?

15	
31	

YES ■ NO

The most important barriers to applying modern teaching technologies in teaching and learning are:

	YES	%
Lack of ICT skills	22	46.81%
Lack of time	16	34.04%
Lack of hardware	23	48.94%
Lack of software	23	48.94%
Inability to access computers	13	27.66%

CONCLUSION: Teachers recognize using online learning platforms as very important and useful activity, but they also admit that have significant difficulties in realizing this activity. One of the difficulties arises from lack of teacher competences (46.81%), which could be improved relatively quickly through various trainings. The second part of the difficulties are related to the equipment that institution (not)owns and this problem is purely of financial nature.

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In your opinion, what ratio (in percent) should be between teaching and learning in education to make education the most successful?

Ratio between teaching and learning

- 25% - 75% - 50% - 50% - 75% - 25%
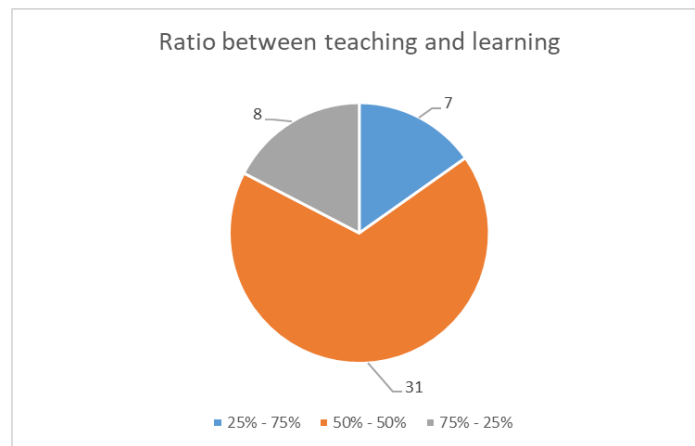
Pedagogical methods and teaching skills

Level of skills in English

	low	middle	high
Listening	3	16	28
reading	0	15	32
writing	1	22	24
talk	5	30	12

CONCLUSION: Majority of teachers has satisfactory English language competence.

Have you ever attended a course in one of the listed disciplines during your formal education?
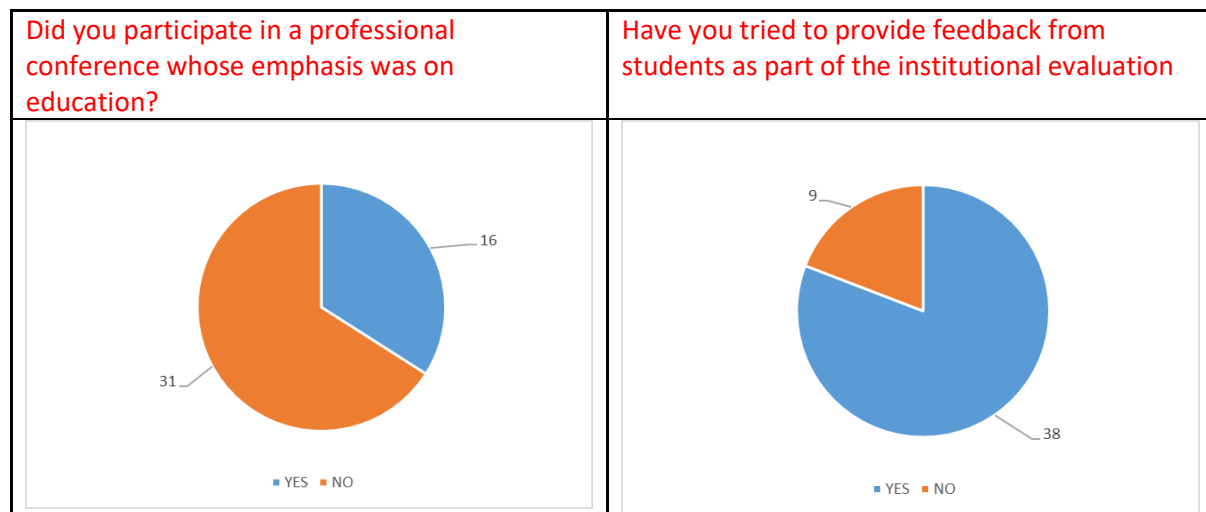
course	Yes	No
Pedagogy	30	15
Psychology	31	15
Teaching methodology	24	18
Application of new technologies in teaching	9	30
English language	42	4
You have not attended a course of any of these disciplines		17

Have you ever held a course or have educated yourself informally (consulting some of the sources: books, articles, online resources, professional organizations, experienced colleagues, mentors, etc.) from one of the above disciplines during your career.

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course	Yes	No
Pedagogy	7	32
Psychology	9	31
Teaching methodology	17	26
Application of new technologies in teaching	18	22
English	25	17
You have not taught or learned a course of any of these disciplines	3	23

Do you consider that the teaching skills of university professors are very important for the quality of their classes?

I totally agree	41
I partially agree	6
I do not agree	0

Did you participate in a professional conference whose emphasis was on education?	Have you tried to provide feedback from students as part of the institutional evaluation

What would motivate you to engage in improving your teaching competencies?

Get more respect from colleagues or students	11	23.40%
Possibility of easier preparation of classes	14	29.79%
Achieve better quality of teaching	37	78.72%
Attracting more students to elective courses	18	38.30%
Getting some financial or material compensation	14	29.79%
You are not interested	2	4.26%

CONCLUSION: Most of the teachers (about two thirds) attended courses Pedagogy, Psychology and Subject Methodology during their initial education, while only a quarter of them had a dedicated ICT course. Most of the teachers (87.23%) consider the teaching skills very important for the quality of the teaching process, and also (78.72%) consider the increase in the quality of teaching as the most important motivation for working on the improvement of teaching skills. Only 4.26% of teachers are not interested in improving their skills. All this indicates that there is a strong motivation for teachers to improve teaching, which is good base for believe that well-designed training and/or prepared materials will give the desired result.

Application of educational strategies, English language and technology in teaching

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On the five-level Lihter scale (1- It's not true at all; 2 - It's not true at all; 3- Equally true and not true; 4 - Generally true. 5. Totally true) responded how much the following claims are true for them

Teaching strategies involving students

Notation	Statement
s1	You provide feedback to students about test solutions, tasks, and ongoing work.
s2	You provide clear information to students on how to evaluate the course they attend.
s3	You give students clear instructions on how to prepare for the next hour.
s4	You give students homework, short-term assignments, an obligation to read something or some other form of preparation for the coming time.

	1	2	3	4	5
s1	1	1	3	11	29
s2	0	0	1	6	39
s3	0	4	2	15	24
s4	0	7	5	18	15
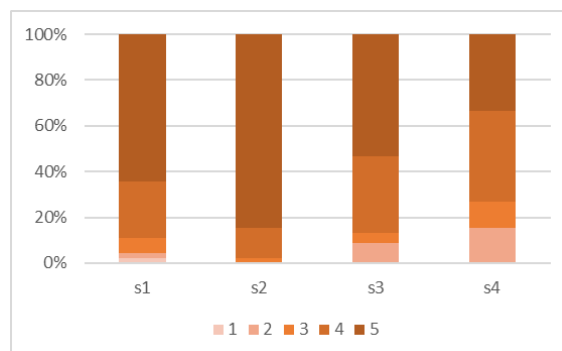
Distribution of the answers to the observed claims

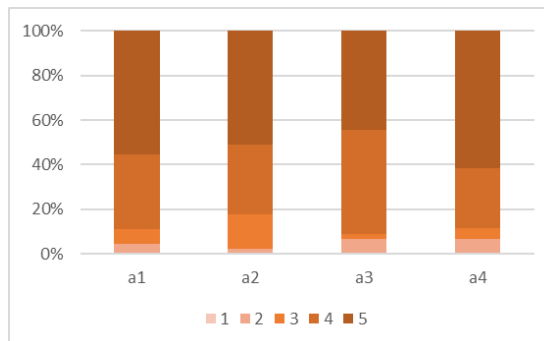| statement	TOTAL			YOUNGER			OLDER		
	mean	median	mod	mean	median	mod	mean	median	mod
s1	4.467	5	5	4.333	5	5	4.583	5	5
s2	4.826	5	5	4.81	5	5	4.84	5	5
s3	4.311	5	5	4.476	5	5	4.167	4.5	5
s4	3.911	4	4	3.952	4	4	3.875	4	4

Mean response values of the respondents

CONCLUSION: Teachers rated with high-grade their teaching strategies (communication with students in order to achieve optimum results in teaching and learning). As for the first three statements (S1, S2 and S3), the students agree with those answers.

Intellectual engagement and impact on learning

Notation	Statement
a1	You motivate and encourage students to develop new ideas and find creative solutions to problems during learning.

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a2	You motivate students to seek more solutions to the same problem and compare them.
a3	Usually, you initiate a discussion on classes, about solving complex problems.
a4	You ask students to explain their ideas.

	1	2	3	4	5
a1	0	2	3	15	25
a2	0	1	7	14	23
a3	0	3	1	21	20
a4	0	3	2	12	27

Distribution of the answers to the observed claims

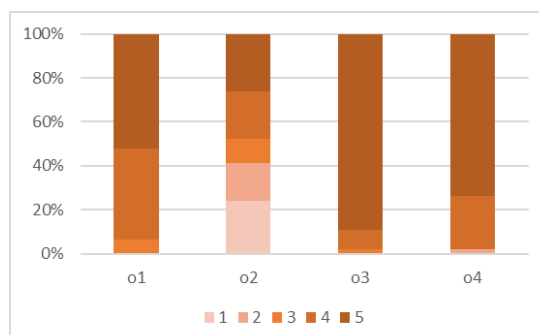| statements	TOTAL			YOUNGER			OLDER		
	mean	median	mod	mean	median	mod	mean	median	mod
a1	4.4	5	5	4.381	5	5	4.417	5	5
a2	4.311	5	5	4.333	5	5	4.292	4	5
a3	4.289	4	4	4.286	4		4.292	4	4
a4	4.432	5	5	4.476	5	5	4.391	5	5

Mean response values of the respondents

CONCLUSION: Teachers have relatively highly estimated their engagement in actively engaging students during lectures, which is not fully supported by student responses. It would be desirable to inspect the reasons for this disagreement.

Relationship: teacher-student

Notation	Statement
o1	Students with you communicate openly and freely.
o2	You are open to various forms of electronic communication through social networks (Facebook, Twitter, etc.).
o3	Relate to the students with respect.
o4	You are communicating with students with a smile and a warm and friendly tone.

	1	2	3	4	5
o1	0	0	3	19	24
o2	11	8	5	10	12
o3	0	0	1	4	41
o4	0	1	0	11	34

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Distribution of the answers to the observed claims

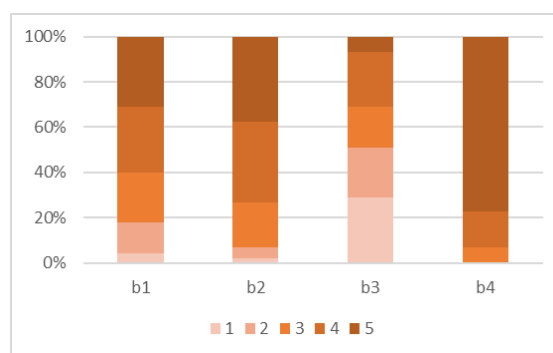| statements	TOTAL			YOUNGER			OLDER		
	mean	median	mod	mean	median	mod	mean	median	mod
o1	4.457	5	5	4.476	4	4	4.44	5	5
o2	3.087	3		3	3	1	3.16	3	5
o3	4.87	5	5	4.952	5	5	4.8	5	5
o4	4.696	5	5	4.714	5	5	4.68	5	5

Mean response values of the respondents

CONCLUSION: The teacher-student relationship was generally characterized by teachers as being very good, which agrees with the assessment given by students. This is very important, because good communication with mutual respect is a prerequisite for a good working atmosphere.

Cooperation

notations	statement
b1	You give students group assignments that they need to finish at class or at home.
b2	You motivate students to share their knowledge and help other students during classes or during the preparation of the exam.
b3	Use collaborative software in communicating with students (Google Docs, Wikis, etc.).
b4	You expect students to engage in discussion and express their opinion.

	1	2	3	4	5
b1	2	6	10	13	14
b2	1	2	9	16	17
b3	13	10	8	11	3
b4	0	0	3	7	34

Distribution of the answers to the observed claims

statements	TOTAL			YOUNGER			OLDER		
	mean	median	mod	mean	median	mod	mean	median	mod
b1	3.689	4		3.667	4		3.708	4	5
b2	4.022	4		3.952	4		4.083	4	4
b3	2.578	2	1	2.524	2	1	2.625	2.5	1
b4	4.705	5	5	4.7	5	5	4.708	5	5

Mean response values of the respondents

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CONCLUSION: According to teachers, they generally consider that in a good way (the average for b1, b2 and b4 is greater than 3.5) stimulate student collaboration during classes and learning, except in case of using collaborative software and communicating with students (the average for b3 is 2.578) . Students are slightly less likely to evaluate these teacher activities as good, but they agree that using collaborative software in communication with students is the least represented.

Student-centered teaching and learning

notation	Statement
c1	You are ready to make certain changes to the contents of your course, to accommodate it to the needs of students.
c2	You respect the priorities and wishes of the students by giving them individual tasks.
c3	Link the contents of your courses with previous knowledge and experience of students.
c4	You are interested in the opinions of students.

	1	2	3	4	5
c1	0	1	0	23	22
c2	1	4	8	19	13
c3	0	0	2	10	33
c4	0	0	1	5	39
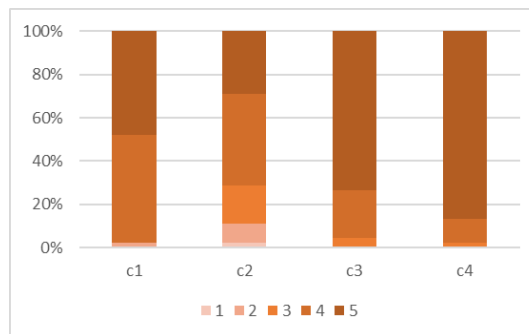
Distribution of the answers to the observed claims

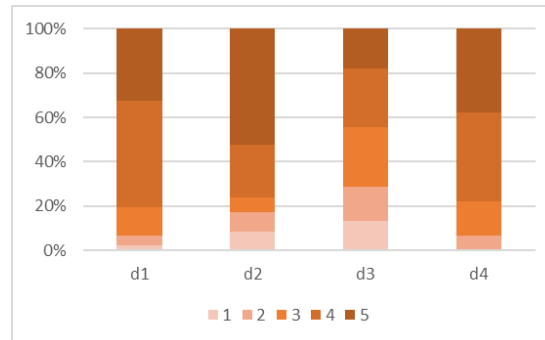| statements	TOTAL			YOUNGER			OLDER		
	mean	median	mod	mean	median	mod	mean	median	mod
c1	4.435	4	4	4.571	5	5	4.32	4	4
c2	3.867	4	4	3.857	4	4	3.875	4	4
c3	4.689	5	5	4.714	5	5	4.667	5	5
c4	4.844	5	5	4.905	5	5	4.792	5	5

Mean response values of the respondents

CONCLUSION: Teachers estimate that they, taking into account the knowledge, interests and abilities of the students, shaped in an enviable manner (the average for c1, c2, c3 and c4 is greater than 3.5) teaching process. In this case again students evaluate these teacher activities as less adequate. It would be important and useful to examine deeper the reasons for this disagreement.

Enthusiasm and way of teaching

Notation	Statement
d1	You change teaching methods to maintain students' interest.

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d2	You use electronic books, presentations, video clips, movies, and more. at their classes.
d3	You use work in pairs, group work, workshops and other techniques to improve interaction during classes.
d4	You motivate students to search for new learning resources beyond required materials and critically assess their reliability.

	1	2	3	4	5
d1	1	2	6	22	15
d2	4	4	3	11	24
d3	6	7	12	12	8
d4	0	3	7	18	17

Distribution of the answers to the observed claims

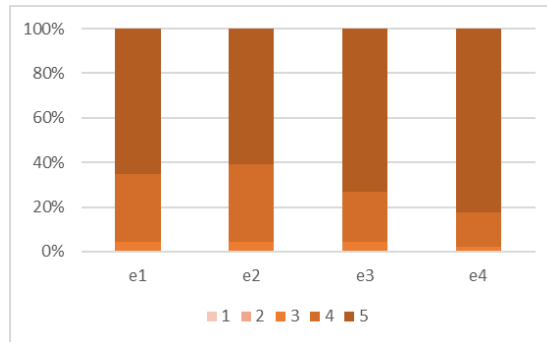|	TOTAL			YOUNGER			OLDER		
statements	mean	median	mod	mean	median	mod	mean	median	mod
d1	4.043	4	4	4.143	4	4	3.96	4	4
d2	4.022	5	5	4.095	4	5	3.96	5	5
d3	3.2	3		3.238	3	3	3.167	3	4
d4	4.089	4	4	4	4	4	4.167	4	

Mean response values of the respondents

CONCLUSION: Majority of teachers estimate that they adapt methods and type of work to students to a great extent. On the contrary, the students consider that only a few professors do it properly. Again, it would be great and helpful to inspect the reasons for this disagreement.

Structure

Notation	Statement
e1	During the lessons you summarize the material and highlight the most important parts.
e2	During the lessons you adjust the time of instruction and manage the time of the organization of the classes well.
e3	Organize and structure teaching materials
e4	You make sure that your classes are well organized.

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	1	2	3	4	5
e1	0	0	2	14	30
e2	0	0	2	16	28
e3	0	0	2	10	33
e4	0	0	1	7	38

Distribution of the answers to the observed claims

statements	TOTAL			YOUNGER			OLDER		
	mean	median	mod	mean	median	mod	mean	median	mod
e1	4.609	5	5	4.571	5	5	4.64	5	5
e2	4.565	5	5	4.524	5	5	4.6	5	5
e3	4.689	5	5	4.667	5	5	4.708	5	5
e4	4.804	5	5	4.81	5	5	4.8	5	5

Mean response values of the respondents

CONCLUSION: Teachers estimate the structure of their classes and lectures as excellent, which stays in line with student assessments.

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