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ACADEMIC TEACHERS' SKILLS AND THEIR POTENTIALITIES OF APPLYING E-LEARNING RESOURCES

Abstract. The presented studies were conducted in 2015-2016, within the project IRNet – *International research network for study and development of new tools and methods for advanced pedagogical science in the field of ICT instruments, e-learning and intercultural competences*, in Poland (University of Silesia in Katowice, Faculty of Ethnology and Educational Science in Cieszyn) and the Czech Republic (University of Ostrava, Faculty of Education). The research was aimed at learning academic teachers' opinions on their own skills and possibilities of using various resources from the e-learning environment, as well as the ways in which they apply information and communication technologies in the educational process.

Keywords: upper education; academic teachers; distance learning; e-learning resources; comparative studies

Introduction. As educational institutions and universities react to the development of modern educational technologies and of educational and learning theories, a higher level of ICT literacy of students – secondary school graduates or people who already work – who start university education is demonstrated by their higher expectations concerning teaching methods and the organization of studies (mainly the use of current ICT technologies). The massification of university education results in both the daily attendance (DA) and combined study (CS) students, studying and working at the same time. The latter means that students prefer the curriculum to be presented in a more distance manner, which does not require their direct presence in classroom. When dealing with the above mentioned phenomena, university teachers intend to (in compliance with their capabilities and qualification) adapt their classes to students' expectations and possibilities and thus ensure the quality of the educational outcomes. Online education, which can be understood as the interconnection of distance education and e-learning, has the potential to take the abovementioned facts into account.

The possible use of this potential can be influenced by a number of organizational, management, pedagogical and technical factors, the analyses of which are the subject of the annually issued reports on the situation of online education and universities in the USA. These analyses are inspiring and draw attention to the critical parts of online learning and its developmental trends. Within the 7th EU framework program called IRNet (*International research network for study and development of new tools and methods for advanced pedagogical science in the field of ICT instruments, e-learning and intercultural competences*), some questionnaire research was conducted in each of the nine countries of the research consortium, which was aimed at finding how important university teachers consider the use of electronic resources in education, for which goals they use them, which resources they use most often, how they help them influence students' activities and what they do to ensure their usefulness to all students.

The use of e-learning resources by academic teachers – research results. At the end of the 2015/16 academic year, the collecting of data from the questionnaire research among academic scholars was carried out. The aim of the questionnaire research was to present the

real picture of the current situation concerning university teachers' opinions on online education and the current situation concerning the use of the basic components of the university electronic environment for educational purposes.

The main research problem was not being familiarized with academic scholars' opinions on the instruments ensuring online education and the absence of relevant data concerning their actual usage in the educational process and for managed self-education of students.

The studies were conducted in 2015-2016 within the IRNet project in Poland, University of Silesia, Faculty of Ethnology and Education in Cieszyn, and in the Czech Republic, University of Ostrava, Pedagogical Faculty.

The Faculty of Ethnology and Educational Science conducts research tasks in the field of pedagogy and ethnology. Its staff conducts projects within both these disciplines. The Faculty is situated in a borderland town and in the heart of multicultural Cieszyn, The region of Silesia is the main determinant of the research profile. The Faculty educates 3 000 students of pedagogy. The process of academic education comprises such academic subjects as e.g. multi- and intercultural education, computer science and information technology. Students make use of the faculty distance learning platform, based on the MOODLE system, which enhances future teachers' preparation for applying e-learning in their work and for undertaking the function of a tutor.

The studies comprised 46 academic teachers, including 30.4% of full-time professors, 39.2% of assistant professors and 30.4% of assistants.

Currently, the Faculty of Education of the University of Ostrava has almost 3300 students, 1900 in the full-time study system and 1400 in the combined type of studying. Most of the subjects are pedagogy-oriented and dominated by disciplines aimed at future teachers training; subjects are taught in bachelor, master and doctoral courses by 107 academic scholars. Since 2003, the faculty has implemented all the three degrees of study that provide training of experts in the field of using informational technologies in education. The research concentrates on the wide spectrum of subjects taught at primary and secondary schools using ICT and also on surveying the achieved results. The Faculty has the Moodle system, electronic informational databases and modern, well-equipped lecture theatres, with smart boards.

The research involved 40 university teachers working at the Pedagogical Faculty of the University of Ostrava, 26 of which were men (65%) and 14 women (35%). 38% of the entire number of 106 academic scholars working at the Faculty participated in the research. The majority of respondents were assistant professors (72.5%), the rest were doctors with habilitation and full-time professors. The majority of them were aged 41-50 (35%) and 31-40 (25%), while 62.5% of the respondents were no older than 50. As far as the level of ICT use is concerned, 7.5% of the respondents considered themselves beginners, 62.5% considered themselves intermediate and 30% advanced users. The questionnaire was sent via email to all 106 teachers of the Pedagogical Faculty of the University of Ostrava. They were asked to fill it in the Google environment. It was up to the addressed teachers whether or not they wanted to participate in the research. Therefore, it can be said that the selection of respondents was random.

Using e-learning resources by academic teachers is associated with self-assessment concerning their own skills and potentialities.

The first level assessed by academic teachers is represented by the following answer: partial use of information instruments in teaching (presentations in class, computer tests, the exchange of information via e-mail, etc.).

The second level is represented by the following answer: creation of e-learning courses, the use of information technologies in the system.

The third level is represented by the following answer: creation and support of open educational resources (MOOC – massive open online course, personal open online resources – e-portfolio).

Using the five-point scale the respondents were asked to evaluate the three levels according to the frequency of use (1 means a low degree of use and 5 means a high degree of use).

The “first level” of the application of ICT was evaluated above the average (3.8). The degree of the “second level” of the use of ICT was significantly lower. The application of massive open online courses or open education resources was rare (see: Table 1 and Figure 1, respectively).

Subsequently, the hypothesis that “the user level” of teachers concerning ICT influences the level of their application was tested (see: Figure 1). The comparison was made through the Mann-Whitney U test. However, no statistically significant difference was determined. Therefore, with regard to the respondents’ user level, their answers concerning this group of answers are uniform.

Conducting the Mann-Whitney U test confirmed one statistically significant difference. Polish academic teachers assessing their ICT skills as “advanced” significantly more often than their colleagues from the less advanced group evaluate the creation of e-learning courses the highest (the result of the Mann-Whitney U test: $Z = 1.99$; $p=0.04$ – cf. Table 2).

Table 1.

Frequency of the application of ICT in education according to three quality levels

Item	Mean		Std. Deviation	
	Czech R.	Poland	Czech R.	Poland
Partial use of information instruments in teaching	3.8	4.3	1.42	0.96
Creation of e-learning courses, use of information technologies in the system	2.3*	3.4	1.44	1.65
Sig. (M.-W. test)	2.71 p = 0.007			
Creation and support of the open educational resources	1.4	3.0	0.92	1.61
Sig. (M.-W. test)	4.48 p = 0.000007			

* In all tables, statistically significant differences are marked in bold

Source: own elaboration

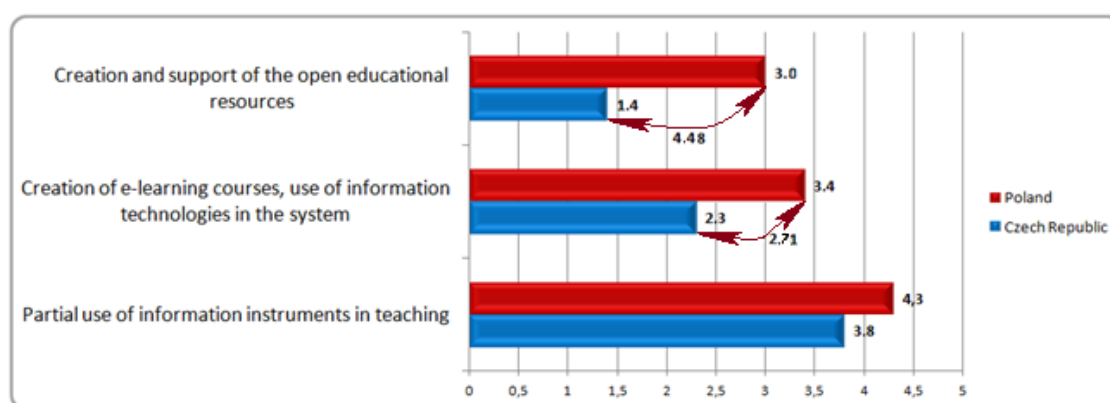


Fig. 1. Frequency of the application of ICT in education according to three quality levels

Source: own elaboration

Moreover, the conducted Mann-Whitney U tests for the staff groups of both universities (in Poland and the Czech Republic) confirmed statistically significant differences in the declarations concerning the creation of e-learning courses by the result $Z = 2.7$; $p = 0.007$ and the creation and support of open educational resources by the result $Z = 4.48$; $p = 0.000007$.

On the first case, the staff of the Polish university statistically more often use the evaluating declaration: the highest level of application. In the second case, there is a statistically significant difference which consists in more frequent use by Czech academic scholars than by Polish ones of the evaluating declaration: the lowest level of application. Polish academics statistically more often indicated a higher (the fourth and fifth) level of creating and supporting open educational resources. These statistics were placed in Tables 1 and 2 and graphically presented in Figure 1.

Table 2.
Influence of teachers' user level in the ICT field on the level of ICT use in education

ICT competence		Partial use of information instruments in teaching		Creation of e-learning courses, use of information technologies in the system		Creation and support of the open educational resources	
		Czech R.	Poland	Czech R.	Poland	Czech R.	Poland
Advanced users	Mean	3.92	4.29	2.92	4.29	1.58	3.14
	Std. Deviation	1.443	1.113	1.782	1.496	1.084	1.676
Beginners or intermediate users	Mean	3.75	4.25	2.07	3.06	1.25	3.00
	Std. Deviation	1.430	0.931	1.215	1.611	0.844	1.633
Total	Mean	3.80	4.26	2.33	3.43	1,35	3.04
	Std. Deviation	1.418	0.964	1.439	1.647	0.921	1.609
Sig. (M.-W. test)		0.637	0.22	0.135	1.99 (p = 0.04)	0.244	0.138

Source: own elaboration

The respondents were asked to select those of the fifteen proposed resources which they use in education. They were allowed to choose as many resources as they wished.

The teachers preparing electronic content for their courses (probably in the form of PowerPoint presentation) represented one-fourth of the 106 selected answers. The majority of teachers (87.5%) do this. It is followed by the preparation of film fragments and television or radio shows (12.9% of all answers and 45% of all teachers) and the preparation of digital materials for self-study (12.1% of all answers and 42.5% of all teachers). Another frequent answer was that the teachers prepare thematic websites (11.4% of all answers and 40% of all teachers). Other applications are presented in Table 3 and Figure 2, respectively.

Table 3.

The most frequently used resources for the preparation and realization of education

Items	Frequency		Percentage of teachers		Percentage of cases	
	Czech R.	Poland	Czech R.	Poland	Czech R.	Poland
I prepare electronic content for my courses	35	40	87.5	87.0	25.0	14.1
Fragments of films, television or radio programs, etc.	18	24	45.0	52.2	12.9	8.5
I prepare digital materials to help students with self-study	17	30	42.5	65.2	12.1	10.6
Thematic websites	16	26	40.0	56.5	11.4	9.2
Electronic resources developed by students as part of their projects	11	28	27.5	60.9	7.9	9.9
Sources from scientific databases of various universities	10	12	25.0	26.1	7.1	4.2
E-books as an additional recommended reading	8	22	20.0	47.8	5.7	7.8
Educational programs	7	20	17.5	43.5	5.0	7.0
Independently created e-courses	7	24	17.5	52.2	5.0	8.5
E-books as the major recommended reading	5	14	12.5	30.4	3.6	4.9
Digital multimedia learning objects from the accessible collections	4	18	10.0	39.1	2.9	6.3
Virtual laboratories	1	4	2.5	8.7	0.7	1.4
List of current educational information resources in education	1	10	2.5	21.7	0.7	3.5
Institutional repository	0	12	0.0	26.1	0.0	4.2
Total	140	284	350.0	617.4	100.0	100.0

Source: own elaboration

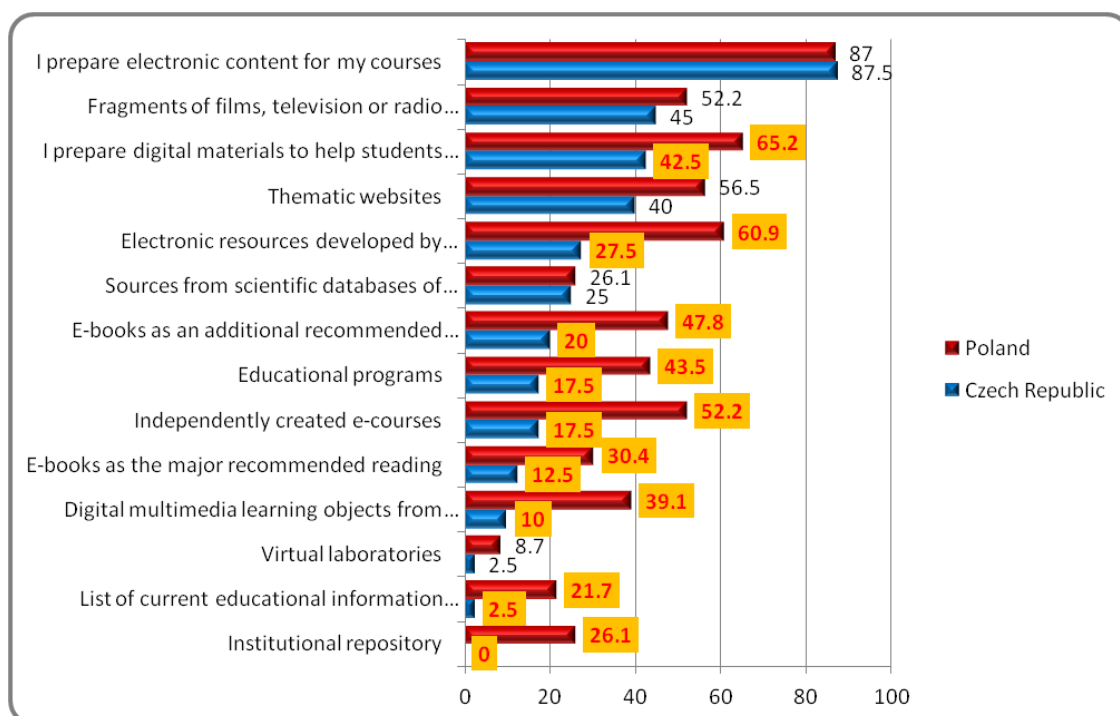


Fig.2. The most frequently used resources for the preparation and realization of education

Source: own elaboration

The statistical significance was verified of the differences in the answers concerning the ways of using e-learning resources in the didactic activity of the examined groups from both universities – in Cieszyn and Ostrava. The results of statistical analysis were presented in Table 3 and Figure 2 (the pairs of data which statistically differ are marked in red against the orange background). The conducted Chi-square tests confirm significant differences between the examined groups in the answers concerning the ways of using e-learning resources in didactic activity:

1. I prepare digital materials to help students with self-study – statistics: $\chi^2 = 4.5$; $p < 0.05$ and $\Phi = 0.23$
2. Electronic resources developed by students as part of their projects – statistics: $\chi^2 = 9.6$; $p < 0.05$ and $\Phi = 0.33$
3. E-books as additional recommended reading – statistics: $\chi^2 = 7.3$; $p < 0.05$ and $\Phi = 0.29$
4. Educational programs – statistics: $\chi^2 = 6.7$; $p < 0.05$ and $\Phi = 0.28$
5. Independently created e-courses – statistics: $\chi^2 = 11.2$; $p < 0.05$ and $\Phi = 0.36$
6. E-books as the major recommended reading – statistics: $\chi^2 = 4.0$; $p < 0.05$ and $\Phi = 0.22$
7. Digital multimedia learning objects from the accessible collections – statistics: $\chi^2 = 9.5$; $p < 0.05$ and $\Phi = 0.33$
8. List of current educational information resources in education – statistics: $\chi^2 = 7.1$; $p < 0.05$ and $\Phi = 0.29$
9. Institutional repository – statistics: $\chi^2 = 12.1$; $p < 0.05$ and $\Phi = 0.38$

In all cases where differences were statistically significant, the answers were chosen by the staff from the Polish university in Cieszyn.

The hypothesis was also tested that the use of individual resources is influenced by subjectively felt ICT skills level of university teachers about which they were asked. They could evaluate themselves as advanced users, intermediate users or as beginners. Due to the low number of respondents, the beginner and intermediate user categories were merged.

Table 4.
Influence of ICT skills level on the use of individual resources [CZ]

Item [in the Czech Republic]		Advanced users	Beginners or intermediate users	Total	Sig.	Test
I prepare digital materials to help students with self-study	Count	8	9	17	.043	Pearson Chi-Square
	%	66.7%	32.1%	42.5%		
Thematic websites	Count	8	8	16	.037	Fisher's Exact Test
	%	66.7%	28.6%	40.0%		
Independently created e-courses	Count	6	1	7	.001	Fisher's Exact Test
	%	50.0%	3.6%	17.5%		

Source: own elaboration

The advanced users' evaluation of the use of three entries is different from beginners or intermediate users (see: Figure 4): "I prepare digital materials to help students with self-study" (chi-squared significance = 0.43), "Thematic websites" (Fisher's test significance = 0.037, chi-square test could not be used due to a high number of low expected frequencies), "Independently created e-courses" (Fisher's test significance = 0.001). All three entries are used more frequently by the advanced users.

Table 5.
Influence of ICT skills level on the use of individual resources [PL]

Item [in Poland]		Advanced users	Beginners or intermediate users	Total	Sig.	Test
E-books as the major recommended reading	Count	8	6	14	0.015	Fisher's Exact Test
	%	57.1%	18.8%	30.4%		
List of current educational information resources in education	Count	6	4	10	0.047	Fisher's Exact Test
	%	42.9%	12.5%	21.7%		
Electronic resources developed by students as part of their projects	Count	12	16	28	0.027	Fisher's Exact Test
	%	85.7%	50.0%	60.9%		

Source: own elaboration

The advanced users' evaluation of the use of three entries is different from beginners or intermediate users (see: Figure 4): "E-books as the major recommended reading" (Fisher's test significance = 0.015), "List of current educational information resources in education" (Fisher's test significance = 0.047), "Electronic resources developed by students as part of their projects" (Fisher's test significance = 0.027). All three entries are used more frequently by the advanced users.

Using the five-point scale the respondents were asked to evaluate the significance of the use of six given electronic resources in education (1 means low significance and 5 means high significance). Values in Table 6 and Figure 3 respectively show that teachers consider the possibility to provide students with study materials and organize their group or individual work as the most significant.

Table 6.
Examination of the significance of the use of electronic resources in the selected parts of university education

Item	Mean		Std. Deviation		Sig. (M.-W. test)
	Czech R.	Poland	Czech R.	Poland	
To provide necessary study materials	3.65	4.00	1.292	1.243	Z=1.4; p=0.19
To organize classes of self-study for students	3.33	4.00	1.328	1.044	Z=2.5; p=0.02
To provide distance learning	3.28	3.48	1.485	1.648	Z=1.0; p=0.35
To increase students' interest in the studied subject	3.13	4.13	1.265	0.920	Z=3.7; p=0.00
To organize students' work	3.08	3.96	1.163	1.107	Z=3.5; p=0.00
For inspection, introspection, and reflection	2.85	3.96	1.210	1.147	Z=4.0; p=0.00

Source: own elaboration

The comparison of the answers evaluating the significance of the purpose for which electronic educational resources are used independently in Polish and Czech scholars' own didactic activity confirms significant differences (cf. Table 6 and Figure 3, in which significant statistics – Mann-Whitney's U Test – are marked in red).

The comparison of answers within the group of researchers from Ostrava confirmed the existence of significant differences in the assessment of particular scopes of didactic activities. Porównanie odpowiedzi w obrębie grupy naukowców z Ostrawy potwierdziło istnienie istotnych różnic w ocenach poszczególnych zakresów działań dydaktycznych. Friedman's Chi-square test ANOVA (N=40, df=5) = 25.51 for p = 0.0001 < 0.05.

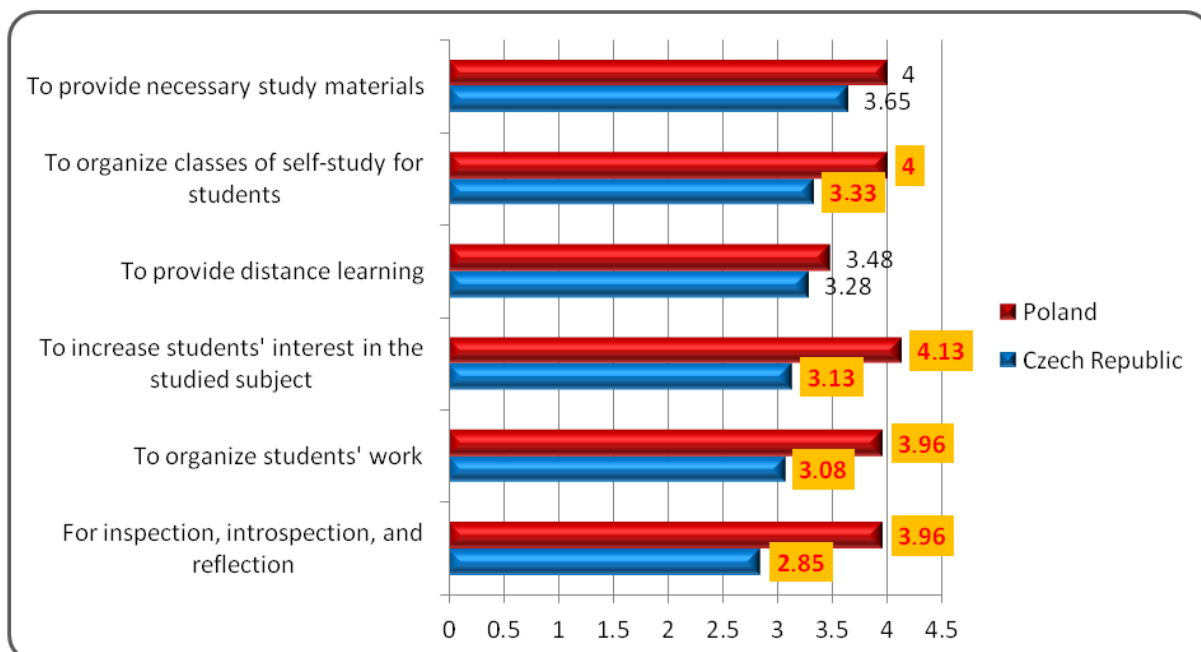


Fig. 3. Examination of the significance of the use of electronic resources in the selected parts of university education
Source: own elaboration

It was not possible to compare the averages (the data are not normally distributed). As Mann-Whitney's result, the medians had to be compared through Friedman's test. The result of Friedman's test (significance = 0.0001) proved that the opinions of academic scholars on the significance of the use of the mentioned resources differ. They consider some resources to be more significant than other (cf. Figure 4).

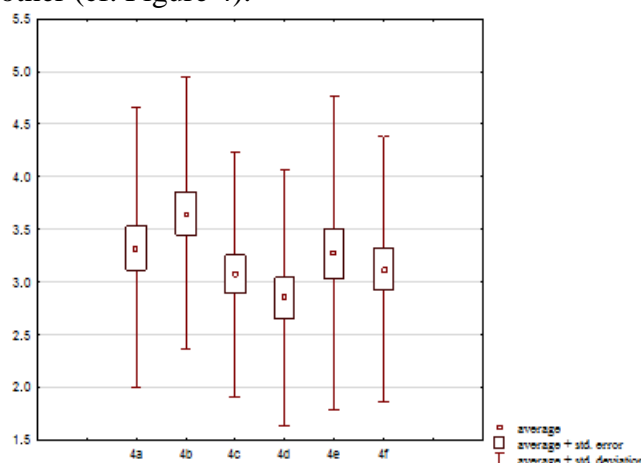


Fig. 4. Comparison of the answers concerning the significance of particular aims of using electronic educational resources in the didactic activities of the group of academic scholars from Ostrava

Key: 4a: To provide necessary study materials; 4b: To organize classes of self-study for students; 4c: To provide distance learning; 4d: To increase students' interest in the studied subject; 4e: To organize students' work; 4f: For inspection, introspection, and reflection
Source: own elaboration

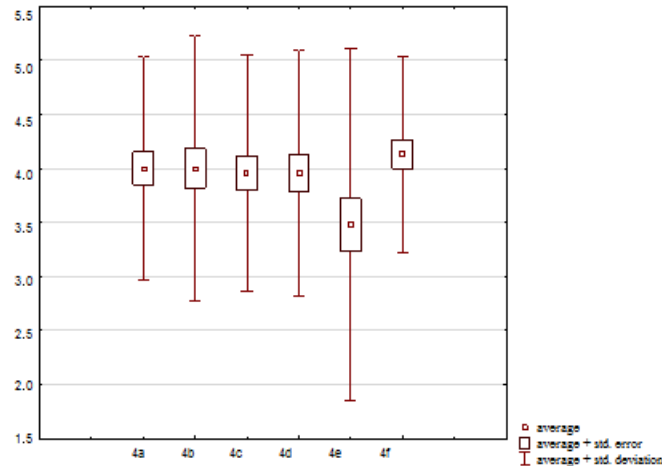


Fig. 5. Comparison of the answers concerning the significance of particular aims of using electronic educational resources in the didactic activities of the group of academic scholars from Cieszyn

Key: 4a: To provide necessary study materials; 4b: To organize classes of self-study for students; 4c: To provide distance learning; 4d: To increase students' interest in the studied subject; 4e: To organize students' work; 4f: For inspection, introspection, and reflection
 Source: own elaboration

This issue is viewed in a different way by the academic staff from the University of Silesia. In this case, the analyses do not confirm the existence of significant differences. The evaluations of particular aims of using electronic educational resources in didactic activities are higher but at a similar level (cf. Figure 5). Friedman's Chi-square test ANOVA (N=46, df=5) = 10.0 for $p = 0.08 > 0.05$.

Conclusion. The research results showed that, within the scope of blended learning, university teachers use a number of electronic instruments for the implementation of education, the management of students' self-study and study communication to enhance the elements of online distance learning. Its actual choice or potential preferences are not much influenced by teachers' age but rather by their user level of ICT competence and in some cases also by their involvement in social networks. So far, teachers have used few specific educational applications and they prefer generally user-defined instruments. University teachers use or think over the application of electronic instruments for the preparation and realization of education or for consultations with students rather than for the organization of students' study activities and online learning. Even though they prefer the incorporation of individual communication instruments for all students, the higher the ICT competence user level is, the more diverse their preference is, concerning instruments which would reflect students' learning styles when they are provided with electronic resources.

In the next stage of realization of the IRNet project, the results of the questionnaire research obtained in the Czech Republic will be included in a comparative study containing the data collected in the other participating countries. On the basis of the results, some generally applicable conclusions can be made concerning the application of electronic information resources in university education with varying degrees of using online education.

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