INFORMATION SOCIETY TECHNOLOGIES IN THE STUDY PROCESS: TEACHERS' PERSPECTIVE

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Abstract

Today's students represent a new, Web generation who has grown up surrounded by digital technology, where the ubiquitous communication is a matter of course (Prensky, 2001). Activities prevailing in modern learning process are communication, knowledge management and mastering new technologies. Broader opportunities for the new generation to access education and communication are the main reasons for the growing use of the new Information Society Technologies (ISTs): social networks, blogs, wikis, communities' bookmarks, messaging and others (Redecker et al., 2010). Thus, advancement of the knowledge age, where lifelong learning is a necessity, guidance in a new learning paradigm, the European dimension in education are the factors that determine the relevance of new ways of teaching and learning adapted to students' specific ways of thinking and based on new IST. So, IST application in teaching/learning process implies not only new opportunities, but also challenges for the teacher: there is a need for the competence, enabling efficient application of IST in teaching/learning process while seeking educational aims. This article aims to identify teachers' use of ISTs, their attitudes in respect to the IST use, encountered pitfalls and barriers.

Keywords: Information society technologies (ISTs), IST application, study process, college teachers' attitude

Introduction

Preceding technologies (projectors, video) did not support greater students' autonomy and very little changed pedagogical practice (Schelling,

2001). Computers, unlike previous technologies, provide students with opportunities to learn through dynamic images, simulations and models, as well as vast quantities of valuable and worthless information. Modern higher education schools are to prepare technologically proficient students (Abas, 2010). Education must undergo changes by considering technological development, both general and online, and changing employers' requirements which emerge as an outcome of social, economic and political development, and involvement of students' daily learning habits, in particular. With the use of state of the art IST in the study process educational context and methodology will be more acceptable in terms of current students' life and interests. Due to IST not only new learning opportunities open up, but also boundaries of time and place disappear: learning is accessible anytime, anywhere, using variety of sources, IST penetration in various areas of life change educational goals and/or its curriculum, as well as the role of the teacher (Goodyear et al., 2001). Students are more flexible to choose where, at what pace, when and what steps to take in learning, they also have more freedom to choose subjects, training schedules, programmes, exams and teaching methods. These factors expand the audience of students, enable a more flexible learners' communication, wider range of teaching/learning methods. Cox and Abbott (2004) argue that students like to use the IST; they become more responsible for their own learning and more independent of the teacher.

So, the *object of the research* reported in the paper is the use of IST by the faculty in the teaching process. The article aims at evaluating college teachers' use of IST in teaching process and identifying their attitudes towards the advantages, pitfalls and barriers of IST use for learning purposes. *The research objectives are*: 1) to describe the aspects of IST application and the role of the teacher using IST; 2) to investigate the kinds of IST and purposes of their use in teaching process; 3) to reveal the teachers' attitudes towards the advantages, pitfalls and barriers of using IST for learning purposes. *Research methodology*: analysis of scientific literature, survey, statistical data processing

The aspects of IST application in study process

Recently, one of the most important issues related to educational change and innovation is the application of information society technologies (IST). Currently, in parallel with virtual learning environments (VLEs), there are plenty of other IST tools suitable for the use in teaching/learning, synchronous and asynchronous communication tools, Web 2.0, 3.0 technologies and others. Having summarized various authors' ideas (Tinian, 2002; Sahay, 2004; Buiskool, Broek, 2010) about the role of IST in study

process, the following key aspects of IST use for learning have been identified:

1) *IST as an object*: self-learning technology to acquire digital literacy.

2) *Management tool*: IST is used as a tool for teaching /learning, such as preparing lectures or carrying out tasks, processing of data and documents, communicating and research, search of digital learning resources, digital learning resource modelling and development.

3) *Tool facilitating teaching and learning*: IST is basically just a tool. It can be hardware (e.g., computers, digital cameras), software (e.g., discussion forums, blogs, VLE, presentations) or both facilities. Educational context is usually associated with a variety of resources and software tools. IST allows arranging teaching, performing practical tasks, modelling and application of various teaching methods.

4) *Communication tool*: Communication takes place between teachers, the teacher and student, students via IST tools (e.g., forums). IST facilitates communication and discussion via the Internet outside of school.

Under this scenario IST is just a tool, like any other technology, or more than a tool (White, 2008), which can change people's way of life, transforming education culture. IST plays a huge role due to the use of a wide variety of technologies and emergence of digital content display modes. Integration of new technologies into the learning environment changes students and teachers' behaviour, learning methods, content and other forms of expression.

Teacher's role using IST in education

Today's teachers should perform the roles of experts of their study subject and effective teaching methodology and additionally should be able to help students become fully-fledged knowledge society members. Barkauskaitė notes (2005), good subject knowledge is impossible without cross-curricular integration, digital literacy and communication skills. The most important teaching/ learning mediator is a teacher who must be definitely competent in preparing the 21st century learners with the appropriate use of new media. He must be able to engage their students in learning and make it a pleasant and attractive occupation. Learning should involve all learners into cooperation and participation, enabling them to build and be active learning community members. The fact that students prefer media itself must be properly utilized in teaching/learning process. Describing the new teaching and learning Downes (2005) writes: „Learning is characterized not only by greater autonomy for the learner, but also a greater emphasis on active learning, with creation, communication and participation playing key roles, and on changing roles for the teacher, indeed, even a collapse of the distinction between teacher and student altogether".

In formal learning environments higher education students have to focus on self-learning therefore, planning, design and preparing lectures should be carried out more responsibly, so to encourage students' involvement in learning. A complex challenge is posed for every subject the teacher: knowledge of the subject matter related to the ability to apply the IST and form students' self- directed learning skills. It requires teachers to adopt new roles and acquire new skills, new practices (such as teamwork, learning resource development, social interaction, promotion and development of the online environment). Teachers' work is changing, but that does not diminish their role, just as in the past huge libraries and books did not replace teachers. Conducted studies and analysis (Bourdeau, 2004; Postman, 1995) show that learning process is not so simple. This is not a replacement of the teacher by a computer, but the appropriate use of technology in the study process. Even the most sophisticated social network or web camera cannot replace real human or be an equivalent of a lecture in the classroom.

Technological change requires the teacher to learn to use the new IST and apply them in their work. Teachers are motivators and facilitators in learning process, who direct students to search for information and creative solutions to problems (McDougall, 2008). The new reality calls for fundamental changes in participants of education as digital competences are becoming the key competences for lifelong learning.

Teachers' use of IST in the study process

A quantitative study was carried out in 2011 seeking to investigate the kinds of IST used by teachers, the purposes of their application in learning process, their attitudes towards the use of IST in learning activities, advantages, pitfalls and barriers. Such parameters as teachers' age, teaching experience, education, gender were considered in the conducted survey. Diagnostic measurements were carried out among college teacher population; the research sample was composed of 5 college teachers (D1, D2, D3, D4, D5), representing Alytus, Kaunas and Vilnius regions (N = 241).

Evaluation of teachers' hardware. The results showed that all teachers have personal computers (99.6%), which means that they have good conditions for lecture preparation, task performance using a computer, id.es apply ICT for training process. The teachers have used computers for at least 4 years. The majority of them (81.7%) indicate that they have more than 8 years experience of working with computers. The interviewed teachers spend 22.92 hours per week online on average for the purposes of learning, work or pleasure. Men (M) spend 27.54 hrs. a week by the Internet on average, whereas women (W) - 21.07 hrs. Although the average age of the surveyed

men and women is similar (M - 43.99, W - 45.62), it has been observed that men use the Internet more frequently.

Use of programs. The survey data suggest the teachers' very active use of IST for study, work or leisure. The majority of the respondents' personal affairs are managed electronically. Even 86.3% of all the teachers indicate downloading/listening to music and videos. Women use this service more often (statistically significant Chi ² = 0.000 obtained, M - 85.5% W - 79.8%). Among the older teachers a lower use of this service was observed. It is worth mentioning that all (14; 100%) art teachers download/listen to music and videos. 89.2% of the teachers use the college library web site, wikis, chat online, using PCs (83.8%), etc. Yet, audio software, video software, podcasts are used much less (see Fig. 1).

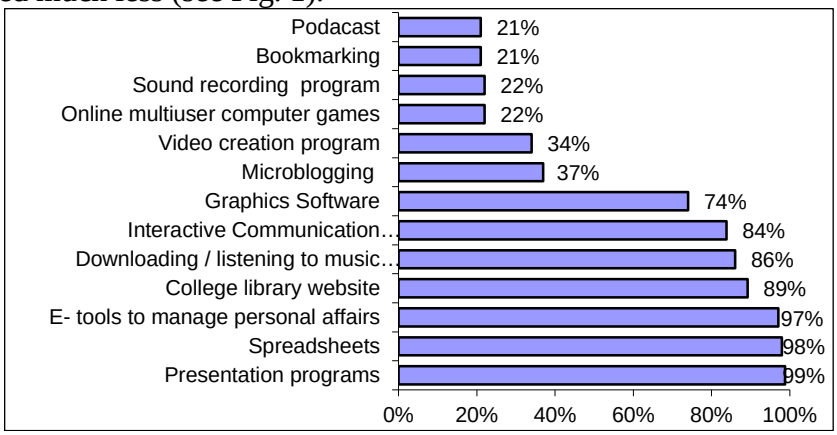

Fig. 1. Use of technology among teachers

Teachers indicate that wikis (Wikipedia, course wikis, websites, which allow creating and editing the content) are used by as many as 7 out of 10 surveyed teachers. The findings have shown that 5 out of 10 teachers (47.9%) enjoy using blogs. Video web (YouTube, etc.) is used by 7.5 out of 10 respondents (75.5%) rather effectively, as well as wikis (Wikipedia, course wikis, etc.), resulting in the opportunities to use these tools in the study process (see. Fig. 2).

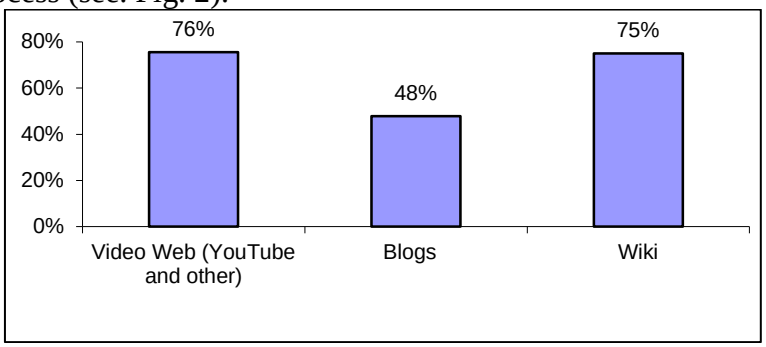

Fig.2. Relevant content sites for study, work or leisure purposes among teachers

Summarising the above discussed findings, it can be said that teachers can significantly expand students' learning opportunities and make learning more attractive by using wikis, videos, web, blogs, audio, video capabilities.

IST in teaching process (*tools used to teach and interact / cooperate*). Teachers use spread sheets for training (Excel, etc. - 46.1%), presentation software (92.5%), graphic software (*Photoshop, Flash, CorelDRAW,* etc.) - 25.7%, audio software (*Audacity, GarageBand,* etc.) 4.1%; video software (*MovieMaker, Director, iMovie, etc*.) (15.5%), specific applications (*Mathematica, SPSS, AutoCAD, STELLA, accounting applications*, etc.) - 33.9%.

Research into the use of online tools for teaching and/or cooperation with students evidences the following: 25.3% of the respondents use forums; 14.9% - video conferencing; 32.8% of the surveyed teachers use videos web (YouTube etc.); 32% of them use audio or video entries (called podcasts); 9.1% - online photo albums (Flickr, Snapfish, Picasa, etc.); 28.6%- social networks (*Facebook, MySpace, Bebo, LinkedIn, Class and so on*.); 42.7% of them enjoy wikis (Wikipedia, course wikis, etc.), whereas just 12% use Internet blogs /weblogs; as many as 44.8%, use a virtual academic community Web 2.0 space of their institution (e-mail, calendar, data storage, communication and collaboration tools such as., Microsoft Windows Live @ Edu, Google Apps for Education, etc.); 33.4 % make use of free online office software (*Google Docs, iWork, Microsoft Office Live Workspace, Zoho and others*); 13.7% of the research sample use- achievement portfolios; 14.9% -interactive maps and 12% - simulation or training games.

Comparison of the distribution of the results by gender the significant difference was obtained in the use of software (in favour of men), graphics software (Photoshop, Flash, CorelDRAW, etc.) ($Chi^2 = 0.000$), video creation software ($Chi^2 = 0.029$), and interactive maps ($Chi^2 = 0.008$).

The survey results indicate that less than half of the teachers use modern IST (forums, blogs, videos, web, etc.) in the study process. Such new tools as webinars, micro blogs, local favourites, online virtual reality, virtual laboratories are hardly ever used for teaching and/or cooperation with students. These tools due to their very occasional use have been removed from the questionnaire.

Educational purposes of IST use in learning activity. Lecturers rated their application of IST in learning activities in 4-point scale: 1 - *I do not use*, 2 - *Probably no*, 3 – *Partly use*; 4 – *I use*. The teachers agree with the statement stronger if the average is closer to 5. Teachers expressed their opinion about the kinds of activities for which they apply IST.

Technology application was divided into three main parts: communication and/or collaboration, management of information and facilitation of learning. The analysis of the scope of IST use showed that the majority of teachers

tend to use IST in almost all learning activities - especially communication and cooperation (90.4%), to organize their work and keep records (86.3%), to prepare for lectures (95.4%), search for digital learning resources (82.5%). Teachers clearly recognize the benefits of technology to facilitate learning: using presentations for material display (91.1%), photos, audio, video (83%), organize students' learning (MOODLE or so, VLE 75.6%). Testing (tests and questionnaires, 68%), individualized teaching (64.7%), to stimulate creativity (68.1%), joint project preparation (66.8%) and problem-based learning (61.8%) are indicated to a lesser extent. More detailed results of the study are presented in Table 1.

Table 1. Educational purposes of IST application in learning activities (percent)

	I do not use	Probably do not use	Partly use	I use
1.Use of technology for communication and / or cooperation				
...with colleagues	3.3	3.3	1.7	91.7
... with students	5		4.6	90.4
...with school adminstration	6.6	4.1	4.1	85.2
2.Personal development and learning	3.3	0.8	5.4	90.5
3. Use of technology as a management tool				
...preparation for lectures	3.3	0	1.3	95.4
...organisation of personal work and record-keeping	3.3	0	10.4	86.3
... search for digital learning resources	7.5	2.5	7.5	82.5
...personal digital learning resource modeling and development	7.1	2.9	12.9	77.1
4. Use of technologies as teaching aids				
...presentation	5.4	0	3.5	91.1
...visualization (photos, audio, video, etc.)	5	2.9	9.1	83
...students practical tasks	4.1	2.9	11.2	81.7
...encouragement of students' autonomy	4.6	0.8	15.8	78.8
...students' learning organization (Moodle or similar VLE)	7.9	0.4	16.1	75.6
...research	6.6	2.1	19.1	72.2
...encouragement of creativity	5.8	2.9	23.2	68.1
...knowledge check (tests and quizzes)	8.3	6.6	17	68
...preparation of group project	6.2	5.4	21.6	66.8
...individualisation of teaching	8.7	4.6	22	64.7
...realization of problem-based learning	7.5	5.8	24.9	61.8

Analysis of the data showed that teachers representing the different science areas vary in the application of IST for training activities. The different nature of the subjects being taught implies this result.

Representatives of the art area are least likely to use technologies for tests and questionnaires to assess students' achievements, organize students' learning (e.g., Moodle), and prepare for lectures.

IST application areas by different colleges' teachers. College teachers from D5 are reluctant to use IST for cooperation, information management, providing educational content and organization of the training process (-0.43), the surveyed respondents from D4 were the most favourably disposed (0.37). College teachers from D1 (0.37) and D3 (0.42) are most likely to realize teaching methods with IST. Although D4 teachers are most likely to cooperate in preparation and presentation of training materials using IST, but they are rather sceptical of IST use for students' activities (-0.28). Z-score of D5 college faculty responses results are the farthest from the zero z-axis down (-1.25, -0.43).

Expression of teachers' innovativeness. Almost half of the teachers (48.1%) update the material when it clearly becomes out-dated, as many as 93.8% of the teachers like to organize textual and/or visual material. 98.3% of them monitor teaching/learning developments in pursuit to improve their teaching/learning process, 98.3% of the respondents search for interesting material and present it to students and also look for ways to diversify learning process, 99.2% of the surveyed teachers encourage students to find interesting materials related to the study subject topics.

Comparing the research results by gender significant differences were obtained using Mann Whitney U method. Women pay more attention to material updating, they like to prepare textual or visual material ($p = 0.041$), are more involved in monitoring developments in learning area ($p = 0.002$), seeking to improve teaching/ learning process they themselves ($p = 0.002$) search for interesting learning materials related to the taught subjects, or encourage students to search ($p = 0.004$). The results by gender according the z-score value are presented below (see Fig. 3).

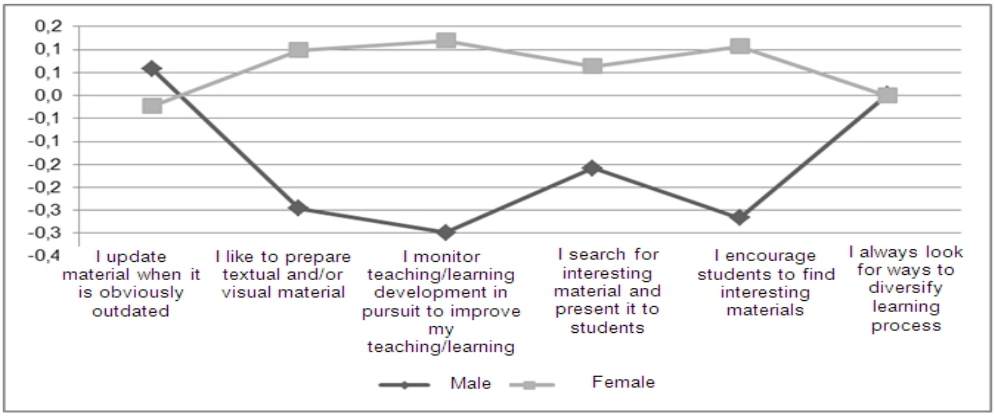

Fig. 3. The significance of features describing teacher innovativeness by gender (z-score)

IST use for learning, advantages, pitfalls and barriers from teachers' perspective. High motivation of IST use in the study process is reflected by respondents' evaluation of the use of IST for training. Responses were assessed using the rank scale from 1 (I do not agree) - to 4 (I agree). Teachers supported the statement stronger if the average appeared to be closer to 4.

The majority of the respondents like the idea of the computer as a teaching tool, the use of teaching and learning (79.2%), they believe that the use of IST makes their course more interesting, attractive and more accessible for students (75.9%). Nearly half of the respondents claim that IST improves student-learning outcomes (47.3%), enhance student involvement in the learning process and increase their motivation to learn (47.7%). Half of the respondents believe that understanding IST and effective use gives more prestige advantage over colleagues (50.6%). More than half of the respondents (62.2%) support the idea that learning with the use of IST is an efficient teaching and learning method. More detailed data are presented in Table 2.

Table 2. Teachers' views on the factors associated with the use of IST for learning activities (per cent)

	Do not agree	Partly disagree	Partly agree	Agree
Advantages				
IST provides a better opportunity to prepare materials for lectures	1.2	1.7	14.9	82.1
I like the idea of the computer as a teaching tool use in teaching and learning	1.7	4.1	14.9	79.2
IST makes my course more interesting, attractive and more accessible to students	2.9	5	16.2	75.9
Learning with the use of IST is an effective teaching/learning method	1.7	12.9	23.2	62.2
IST can help discuss with others, share teaching ideas	3.3	10.4	33.6	52.7
IST provides more prestige and advantage over colleagues	3.7	22	23.7	50.6
IST improves student learning outcomes	5.4	10.4	36.9	47.3
IST enhances student engagement in the learning process and increases the motivation to learn	1.7	19.5	31.1	47.7
Pitfalls and barriers				
The use of computers in teaching and learning causes stress for me	54.8	36.1	5.8	3.3
Lack of self-confidence	44.8	33.6	13.3	8.3
Easier to use conventional teaching methods than new, requiring time and preparation	39.4	38.6	10.8	11.2
Due to my teaching subject particularity use of information technologies is not required	36.9	36.5	18.7	7.9
Lack of encouragement/motivation (reward, evaluation, perspectives)	30.7	43.6	14.9	10.8
Lack of knowledge and skills of technologies	29.9	40.1	21.2	8.8

However, the use of IST in the study process is limited by the number of pitfalls and barriers. According to the teachers, factors preventing IST use in the study process is the lack of incentive for motivation (25.7%), the lack of knowledge and skills of technology (30%), lack of self confidence (21.6%). Only a very small part of the respondents suggest that the use of conventional teaching methods is easier than new, time consuming and requiring preparation (11.2%), due to particularity of the subject IT use is unnecessary (7.9%).

Representatives of all science areas highly value the use of IST for learning, but further examination of the situation revealed that the respondents from social sciences and humanities most experience various barriers hindering the use of IST (lack of knowledge about the technology and skills, confidence, encouragement / motivation (rewards, evaluation, perspectives) particularity of the subject, use of IT is unnecessary, use of computers in teaching and learning leads to stress, and so on.). Art and technology specialists' expressed the most favourable opinion about IST as having a positive impact on student learning outcomes, course attractiveness. Biomedicine and art representatives claim that due to particularity of their teaching subject IST is not required. The most sceptical in respect to technologies are the respondents from humanities and social science fields. Their views are significantly diverged, indicating obstacles and barriers of IST use. A significant split of the opinion that the use of computers in teaching and learning leads to stress has been also observed (significant mean differences of the results between physical sciences and technology survey participants' opinions). Self-confidence, lack of technological knowledge and skills are also identified between the representatives of social sciences and humanities. The research into the participants' attitude towards such factors as encouragement/motivation (rewards, evaluation, perspectives) reveals that they would be most preferred by representatives of technological sciences and least by the art teachers. Graphically the factors of pitfalls and barriers are presented in z-scores (see Fig. 4).

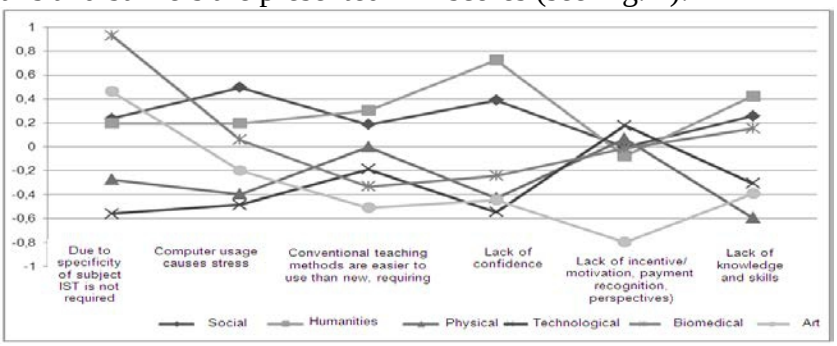

Fig. 4. Teachers' attitude towards the pitfalls and barriers of IST use for learning activities by science fields (z-score)

Analysis of the data between colleges indicates that teachers from the colleges D3 and D4 ranked the impact of technology on learning most favourably. The lowest IST usefulness was observed between D1 college respondents. Comparing college faculty expressed opinions it is obvious D1 College, to a lesser extent - D5 college faculty scepticism about the benefits of IST. Their results of responses are below the z-scale mean scores axis. The analysis of teachers' views on the obstacles and barriers to the application of IST, opinions diverged on several points. The interviewed D5 college teachers are the most self-confident; they experience the least lack of encouragement / motivation and the knowledge and skills (see Fig. 5).

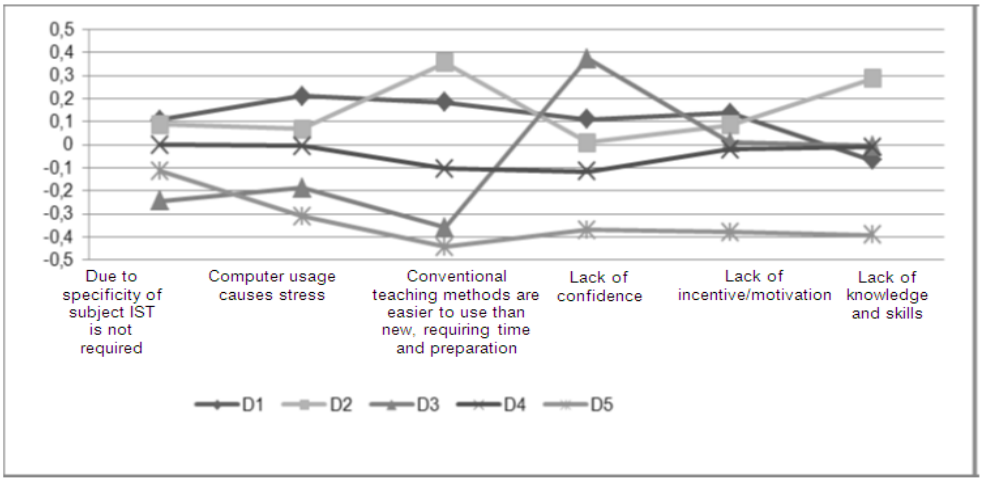

Fig. 5. The different college teachers' approaches to IST use pitfalls and barriers in teaching/learning activities (z-score)

Summing up the results, it can be stated that the majority of teachers recognized the benefits of using IST. They assume that the use of IST makes courses more interesting, more attractive, and more accessible to students. More than half of the respondents indicated that ISTs improve students' learning outcomes, enhance students' engagement in learning process and increase their motivation to learn. Nearly one-third of the respondents consider that lack of stimulation of motivation and technology awareness and skills, self confidence prevent from the use of IST in the study process.

Conclusion

1. IST is associated with effective pedagogical innovations, implementation of a new learning paradigm in the study process. Digital environment has created new opportunities for communication and collaboration, information management, and organization of training, which creates conditions for new teaching and learning methods. The role of the

teacher, teaching forms, methods, content and use of technology are changing; as a result learning is replacing teaching.

2. The conducted study into college teachers' use and application of IST suggests that teachers recognize the benefits and the need of IST. However, the use of ISTs in the study process is limited. IST application for learning purposes spanned a variety of choices depending on the college, as well as the field of science. Nearly one third of the surveyed teachers encounter difficulties in using IST due to such factors as lack of incentive or motivation, poor technological skills, lack of self-confidence.

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