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Changes in university teachers' digital teaching competence as a respond to COVID/19 emergence

Cambiamenti nelle competenze di insegnamento digitale dei docenti universitari come risposta all'emergenza COVID/19

di

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Abstract

The present transformations and challenges that Knowledge Society demands, as well as the main implications that Information and Communication Technologies have over higher education, universities and especially over professional development of teachers of this educational level, have a deep impact not only on their professional profile, functions and roles, but also, on their training and professional competences and skills. However, little attention has been paid to the analysis of digital teaching competence of academic staff in higher education institutions in Lithuania. The amount of training has been underemphasized even though the high quality education is a prerequisite for the institution to survive in the competition between the universities. The COVID-

19 emergency has caused the rapid shift towards the necessity of distance teaching. This shift has required quick respond from the university teachers – they were obliged to change their usual teaching practices and switch to on-line methods. The current study is specifically sought to capture these rapid changes in digital teaching competence of university teachers in Lithuania before and during the emergency. The implications of the study would help providing the paths for further professional development of digital teaching competence.

Keywords: higher education, academic staff/university teachers, digital teaching competence, COVID-19 crisis

Introduction

Traditional teaching in higher education in Lithuania has recently been changing towards technology-based teaching. In recent years, university teachers have been fostered to concentrate more on specialized tasks like virtual course design, planning the assignments and materials for online courses, creating audio and video files, helping and guiding the students, cooperating with different networks and developing processes. Therefore, the university teachers have met the demand to develop skills on how to identify and use different media in designing virtual classes, how to communicate with students with the help of technology and should have acquired understanding of different devices and software, as the ICT-model has been becoming more popular among the universities (Ala-Mutka, 2018). These challenges over university teachers have had a deep impact not only on their professional profile, functions and roles, but also, on their training and professional competence and skills. However, the amount of training has been underemphasized even though the high quality education has been claimed as a prerequisite for the institution to survive in the today's digital world (Gedviliene, Kankevičiene, 2018).

The digitalisation of teaching accelerated at record speed in the wake of the physical closure of universities in Lithuania on 16 March 2020 due to the COVID-19 crisis. The pandemic has forced Lithuanian universities quickly shut down campuses and switch over to online teaching. As a result, education has changed dramatically, with the distinctive rise of e-learning, whereby teaching is undertaken remotely and on digital platforms. The scale and speed of this move online has caught many teachers and universities off-guard. People have coped the best they can, but the quality of what can be done online has often been compromised. The pandemic has highlighted a big gap in university teacher education and professional development. Such unplanned and rapid move to online learning – with no training, insufficient bandwidth, and little preparation – may have resulted in a poor user experience that is unconducive to sustained growth. However, others believe that a new hybrid model of education will emerge, with significant benefits and the integration of information technology in education will be further accelerated so that online education will eventually become an integral component of school education (Council of European Union, 2020). Of course, there has been 20 years' or more discussion in Lithuania before the pandemic of what constitutes university teachers' "digital literacy", "digital competence", "digital fluency", and the like (Steiblytė, Pečiuliauskienė, 2018). These definitions and frameworks have understandably tended to focus on issues of technical proficiency, e-safety and information literacy. Yet, the COVID-19 shutdowns are highlighting the need to go beyond these previous descriptions. Competence development in digitalization and other trends is essential for the university teachers as well as the students.

The current paper is specifically aimed at developing a theoretically grounded model of university teacher's digital competence model. Throughout theoretical analysis of digital competence' key elements a questionnaire for university teacher digital competences' need assessment that allow them to identify their own needs of continuing education and training with respect to their digital competences, offering as well, an open, comprehensive and flexible framework for decision making on continuing training and professional growth was constructed. The survey was based on specific experiences that university teachers reported before and during the two month of teaching during the corona lockdown. Through the survey it was sought to document (1) pre-COVID-19 competence in digital teaching; (2) changes in the competence due to rapid move to online teaching and learning; 3) the use of different tools and pedagogical techniques; (4) practical challenges, and (5) potential implementations on professional development.

The preliminary reflections presented in this paper will serve as the basis of a deeper analysis and comprehension of all the data collected for the purpose of the main study, which is the identification of university teachers' training needs with respect its digital competence, for its later synthesis, structure and prioritization. These results, in turn, will allow to make a training proposal that meet the needs of teachers of the Lithuanian universities that participated in the study. The contribution is organized as follows: the next section introduces the theoretical grounding on digital competence of teachers in higher education. The associated results of the empirical analysis will be presented in the following section. Finally, some concluding remarks are provided followed by a short outlook on interesting topics for further work.

Theoretical grounding

Digital literacy consists of the ability to access digital media and ICT, to understand and critically evaluate different aspects of digital media and media contents and to communicate effectively in a variety of contexts. Digital competence, as defined in the EC Recommendation on Key Competences (EC, 2016) involves the confident and critical use of ICT for employment, learning, self-development and participation in society. This broad definition of digital competence provides the necessary context (i.e. the knowledge, skills and attitudes) for working, living and learning in the knowledge society.

Most of the research efforts were made to investigate digital competence of teachers in secondary schools. It should be noted that digital competence of teachers is an overall concept of such terms as ICT competence of teachers. ICT competence of teachers means that teachers need to be able to help the students become collaborative, problem-solving, creative learners through using ICT so they will be effective citizens and members of the workforce (United Nations Educational, Scientific and Cultural Organization, 2018, p. 3).

The university teacher's digital competence (the competencies) is one response to the challenges and needs identified in recent surveys of and reports on higher education (JISC, 2019). The competence identifies the knowledge and skills expected of any educator. It also offers a structured approach to determining the knowledge and skills that university teachers still need to develop and the professional development activities that will help them to acquire them.

Digital competence for university teachers can be broadly defined as the confident, critical and creative use of ICT to achieve goals related to work, employability, learning, leisure, inclusion and/or participation in society (Ala-Mutka, 2018, p. 1). This means that the teacher must make decisions about what kind of digital tools should be used in each teaching situation, how they

should be used and why (Ottestad et al., 2014, p. 246). It is important to develop this type of awareness during initial teacher.

The digital competence in higher education can be represented in the so called six elements of digital capabilities. The competence consists of: ICT proficiency and fluency, information, media and data literacy, creating and innovating, digital research and scholarship, E-learning and Professional development, communication, collaborating and participating as well as digital identity and well-being (Ahrens et al., 2014).

Digital university teachers' competence is understood at three levels of expertise which are progressive (to reach level 2 it is imperative to have level 1), and which constitute the ideal of university teacher competence in ICT (Koehler, Mishra, 2008). These levels of expertise are:

Level of expertise 1: skills related to base knowledge of the common use of ICT in university work.

Level of expertise 2: skills related to:

a. Design

b. Implementation

c. Evaluating activities using ICT

Level of expertise 3: skills related to the reflection and critical analysis of the actions and activities carried out using ICT.

a. Individually

b. Collectively (with other teachers).

Three main dimensions describe teachers' professional digital competence (Ottestadet al., 2014, p. 248):

- Generic digital competence cuts across subject disciplines and specifies the general knowledge and skills that teachers, teacher educators and student teachers alike should obtain in order to function as digital educators. This dimension is most likely identical, or very close to, the already existing descriptions of general digital competence.

– Didactic digital competence captures the digital specifics in each subject that the individual teacher, educator deems significant. It is in this dimension that the actual distinctive differences in the didactics between subjects would be described, for example, mathematics taught with ICT versus foreign language or pedagogy taught with ICT.

- Professional oriented digital competence describes digital traits of the extended teaching profession, the question of what teachers need of digital literacy in other parts of the job, for example when they are planning subject lessons, sorting evaluations, recording marks and detention, communicating with parents and other groups, etc.

The findings of the present research on the inter-relationships between competence, experience, digital competence of teachers and professional digital competence of teachers serve as a source of determination of what digital teaching competence of university teacher is. Digital teaching competence of university teachers is identified as an individual combination of abilities and experience (knowledge, skills and attitude) in digitalization of teaching. Digital teaching competence of university teachers includes such dimensions as:

- Competence in media and equipment,
- Competence in courses, didactics and instructional design,
- Competence in Learning Management Systems,

- Competence in videoconferencing,
- Competence in social networks,
- Competence in e-moderation.

It should be noted that by a teaching competence, an individual combination of abilities and knowledge and skills as well as attitude to teaching is revealed (Gedvilienė, Kankevičienė, 2018). For the success of professional development, analysis of digital teaching competence is emphasized. In order to increase the impact of trainings for university teachers, empirical analysis of digital teaching competence has to be carried out.

Empirical Analysis

The present part of the contribution demonstrates the design of the empirical study, results of the empirical study and findings of the study.

Design of the empirical research (Research methodology)

The design of the empirical study comprises the purpose and question, sample and methodology of the present empirical study. The present contribution employs interdisciplinary research as interdisciplinary research assists in synthesizing, connecting and blending ideas, data and information, methods, tools, concepts, and/or theories from two or more disciplines in order "to make whole" (Repko, 2012). For analysis of digital teaching competence of university teachers, the synergy between Andragogy and Information and Communication Technology is promoted as the phenomena of education digitalisation and digital education are inter-connected. Such methodologies that consider the inter-relation between education and digitalization have been successfully implemented in higher education as well as teacher training. It should be noted that the present research is not limited to only two scientific disciplines, namely, education digitalisation and digital education, but is based on a number of disciplines such as Learning Management Systems, etc. (Ahrens et al. 2014).

The guiding research question is as follows: What is the level of digital teaching competence of university teachers in Lithuania? This report is based on a survey of university teachers in Lithuania and their experience before the pandemic and after two month of full digital teaching in this period. The purpose of the empirical study is to analyse the changes in the digital teaching competence of university teachers in Lithuania before the pandemic and after two month of digital teaching teaching.

The sample of the present empirical study was composed of 120 university teachers from several universities in Lithuania. The sample was constituted in April, 2020. All the participants had received extensive teaching experience at universities. The group (age, field of study and work, mother tongue, etc.) is heterogeneous.

The exploratory type of the comparative study is applied (Phillips, 2006). The exploratory type of the comparative study aims to generate new hypotheses and questions (Phillips, 2006). The newly developed hypotheses and questions can be tested for generality in following empirical studies (Mayring, 2007). The exploratory methodology proceeds from exploration in Phase 1 through analysis in Phase 2 to hypothesis development in Phase 3.

Questionnaire served as a means of data collection for the analysis of digital teaching competence of university teachers in Lithuania before COVID-19 and after 2 month of teaching online. The questionnaire concentrated on the digital training needs of the teachers and tried to clarify their

attitudes towards digitalization. The questionnaire consisted of seven sections, which were background, competencies, training and digitalization. All of the questions were compulsory.

In order to analyse digital teaching competence of university teachers, the questionnaire was distributed among the prospective users of on-line system for academic staff. The questionnaire covered such topics as

- Media competence,
- Competence in courses, didactics and instructional design,
- Competence in Learning Management Systems,
- Competence in videoconferencing,
- Competence in social networks,
- Competence in e-moderation,
- General questions.

In total, the questionnaire included of 51 questions. The evaluation scale of 5 levels was created where "1" meant "often" / "agree"; "2" meant "sometimes" / "partly agree", "3" meant "seldom" / "more agree then disagree", "4" meant "never" / "disagree", "5" meant "don't know". The evaluation scale was transformed into the level system such as "often" and "sometimes" indicates the optimal level, and "seldom", "never", "don't know" reveals the low level.

Results of the empirical study (Research study outcomes)

Nr.	Question	Pre-COVID-19		After the 2 month of teaching online	
		Optimal level	Low level	Optimal level	Low level
1.	Do you use a PC, smartphone, a tablet computer etc. in teaching process?	58%	42%	100%	0%
2.	Do you use the internet to do research / gather information for the teaching process?	66%	34%	92%	8%
3.	Do you use the internet to communicate with students (e-mail, messenger, video conferences)?	72%	28%	96%	4%
4.	Do you use the internet resources to search for music, movies and to use media in educational process?	74%	26%	98%	2%
5.	Do you publish teaching content (blog, website,)?	58%	42%	88%	12%
6.	Do you use the internet to share content with others (Flickr, YouTube,)?	42%	58%	64%	36%
7.	Do you use open educational recourses (e.g. "EPALE" platform) for teaching purposes?	48%	52%	60%	40%

 Table 1. Media competence

Respondents were asked about their experience with digital teaching. As all university teachers have engaged with some form of digital teaching or use of digital technology in their teaching before the COVID-19, whether by using email, PowerPoint or basic learning platforms such as Canvas, it was focused on whether they had relied solely on digital tools. As shown in Table 1 university teachers in Lithuania have been applying IC technologies in the educational process before the pandemic. However, the figures show that internet and technologies have not served as

the main educational resource. The online work situation required the skills on how and where to find information and how to create knowledge. The slight change in the competence was captured. After the 2 month of exclusively online teaching, respondents demonstrated skills in using internet resources for teaching purposes, skills of content and knowledge creation online. The study participants became more proficient in using differentiated learning environments.

Nr.	Question	Pre-COVID-19		After the 2 month of teaching online	
		Optimal level	Low level	Optimal level	Low level
8.	Do you use Interactive boards (in your teaching settings)?	76%	24%	82%	18%
9.	Do you use E-Books (in your teaching settings)?	52%	48%	78%	22%
10.	Do you use screencasts/e-lectures, podcasts (in your teaching settings)?	38%	62%	58%	42%
11.	Do you use Learning apps on mobile devices (in your teaching settings)?	54%	46%	62%	38%
12.	Do you use 3D printer/fablabs (in your teaching settings)?	18%	82%	24%	76%
13.	Do you use computer game-based learning (in your teaching settings)?	36%	64%	48%	52%
14.	Do you use augmented reality (in your teaching settings)?	14%	86%	14%	86%
15.	Do you use audience response systems (in your teaching settings)?	12%	88%	16%	84%
16.	Do you use learning analytics (in your teaching settings)?	28%	72%	32%	68%
17.	Are you familiar with such instructional design models such as ADDIE, Agile design, SAMR, TPACK, IDOL?	14%	86%	10%	90%
18.	Do you have experience in the design of flipped/inverted classrooms?	8%	92%	10%	90%

Гable 2.	Competence in	courses,	didactics and	l instructional	design
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Ensuring online teaching is interactive is both assisted and challenged by the various technologies. Respondents were asked about which type of software they used in teaching before and during the lockdown. As shown in the Table 2 university teachers in Lithuania have become slightly more skilful users of various electronic educational apps and technologies. However, professional development goals still should be taken into account.

	Table 5. Competence in Learning Wanagement Systems					
Nr.	Question	Pre-COVID-19		After the 2 month of teaching online		
		Optimal level	Low level	Optimal level	Low level	
19.	Do you have experience in the use of LMS as e.g. Blackboard, Moodle, Canvas?	98%	2%	98%	2%	
20.	Do you use Learning Management System such as Stud.IP, Ilias, Moodle, Blackboard, Olat, CommSy, etc.?	96%	4%	92%	8%	
21.	Have you hosted/moderated fora?	10%	90%	18%	82%	
22.	Have you set up hand-in assignments?	52%	48%	62%	38%	
23.	Have you set up the production of glossaries?	18%	82%	38%	62%	
24.	Have you set up the production of wikis?	12%	88%	18%	82%	
25.	Have you moderated the use of blogs / learner diaries?	40%	60%	74%	26%	
26.	Have you moderated the use of automated tests/quizzes?	38%	62%	68%	32%	
27.	Have you created scenarios using rubrics?	32%	68%	28%	72%	
28.	Have you moderated the production of e- portfolios?	10%	90%	20%	80%	

Table 3. Competence in Learning Management Systems

The data indicates that most respondents have changed various aspects of their teaching. Most of them organised their lectures online, either live or pre-recorded. A high number of those responding have made efforts to re-organise their regular interactive activities (seminars, group work) in such ways that these can take place online (mainly in Zoom). Discussions and group discussions seem to be a popular format. Some have organised work with assignments prior to meetings or being more available for answering questions and providing written feedback online. There are also respondents who report that they only switched their regular teaching to an online context, without many changes. As shown in Table 3 the evaluation of the digital skills of students is crucial. Teachers need to support digital literacy with different study methods. The new technology enabled course structures leads to the improved quality of teaching.

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Nr.	Question	Pre-C	Pre-COVID-19		After the 2 month of teaching online	
		Optimal level	Low level	Optimal level	Low level	
29	Are you experienced in the use of video conference systems (e.g. Zoom, Microsoft teems, Adobe Connect, Blackboard Collaborate, Google Hangouts, Skype)?	38%	62%	100%	0%	
30	Are you acquainted with the use of different layouts?	22%	78%	94%	6%	
31	Are you acquainted with role rights and their administration?	40%	60%	88%	12%	
32	Are you able to share your screen or applications with others?	34%	66%	100%	0%	
33	Are you able to record an online session?	30%	70%	92%	8%	
34	Are you able to send participants to breakout rooms (and bring them back)?	28%	72%	50%	50%	

 Table 4. Competence in videoconferencing

First, like other sectors, there has been a Zoom revolution in online teaching. Almost 80% of respondents reported using the programme. Further behind but still prominent were new programmes or features not commonly used before such as Microsoft Teams, Skype. As shown in Table 4 when it comes to the videoconferencing skills of the teachers, they have to develop their pedagogical content skills. This means the skills of how the teachers can combine their knowledge and skills when teaching with videoconferencing to different kinds of learner groups. Technologies can help structure interaction – e.g., speedy creation of a breakout room or question-based tools like Mentimeter and Kahoot that can function for large groups. On the other hand, students and teachers appear to be less used to engaging in interaction in a fully digital educational space. Still, videoconferencing can help the teachers to improve their professional awareness if they have positive attitude towards ICT development.

Nr.	Question	Pre-COVID-19		After the 2 month of teaching online		
		Optimal level	Low level	Optimal level	Low level	
35	Are you a member of social networks (LinkedIn, Xing, Facebook, Twitter, Google+ or similar)?	98%	2%	100%	0%	
36	Do you use social networks in teaching / e- moderation?	68%	32%	86%	14%	
37	Do you use social networks to distribute information?	88%	12%	94%	6%	
38	Do you use social networks in the design of learning scenarios/tasks?	54%	46%	68%	32%	
39	Do you use scenarios as TwitterWalls to get student feedback in face-to-face settings?	12%	88%	18%	82%	

 Table 5. Competence in social networks

As shown in Table 5 teachers have to be cooperative and to share different ideas by socialization, different communities and networks. Networking, especially with those organizations that have already utilized technology, helps the other organizations to imitate good practices. The communication will help teachers to assess critically information and create new ideas.

	Table 0. Competence in c-moderation					
Nr.	Question	Pre-C	Pre-COVID-19		After the 2 month of teaching online	
		Optimal level	Low level	Optimal level	Low level	
40	Do you have experience as an e-moderator of online classes?	88%	12%	92%	8%	
41	Have you moderated courses via e-mail and/or fora in learning management systems?	24%	76%	38%	62%	
42	E-moderation is a key factor for successful online study programmes.	46%	54%	74%	26%	
43	Workload in e-moderation compared to face- to face is less complicated	26%	74%	74%	26%	

Table 6. Competence in e-moderation

As shown in Table 6 when the proper technology is selected for pedagogic purposes carefully and utilizing the expertise of teachers, the quality of teaching is improved.

Table 7. Demand for professional training

Nr.	Question	Pre-COVID-19		After the 2 month of	
				teaching online	
		Optimal	Low level	Optimal	Low
		level		level	level
44.	Readily available support and consulting is	100%	0%	98%	2%
	important for the introduction of e-learning				
45.	Didactic training of teaching staff is	100%	0%	100%	0%
	important for the introduction of e-learning				
46.	Training of teaching staff in Learning	100%	100%	100%	0%
	Management Systems, multimedia and				
	technology is important for the				
	introduction of e-learning				
47.	Training of teaching staff in LMS,	100%	0%	98%	2%
	multimedia and Technology is important				
	for the introduction of e-learning				
48.	Media literacy of teaching staff is	98%	2%	98%	2%
	important for the introduction of e-learning				
49.	Media literacy of students is important for	100%	0%	98%	2%
	the introduction of e-learning				
50.	Motivation of teaching staff is important	96%	4%	98%	2%
	for the introduction of e-learning				
51.	Motivation of students is important for the	98%	2%	98%	2%
	introduction of e-learning				

As shown in Table 7 along with the trends, the teachers require continuous development of themselves. Most of the respondents felt that teacher education does not provide good digital skills and at least some update is required. The knowledge of the importance of digitalization should be added in order to increase the motivation to learn. According to the competence development survey, the teachers felt the change towards digitalization mainly positive. Also the management emphasized the importance of information sharing. The communication and feedback should be increased. The negative influences of digitalization should be also taken into account.

The abrupt transition to digital teaching raises questions as to whether traditional forms can be maintained or merely digitized. The results of the study report that digital competence of university teachers in Lithuania has changed. This can be both positive and negative. Good online learning requires adjusted methods but the changes may be also motivated only by the corona crisis and represent a second-best. While reported figures can be perhaps best explained by the corona, it is still important that university teachers have needs for professional development in the field of digital teaching.

Findings of the empirical study (their analysis)

University teachers in Lithuania have been thrown into a new teaching situation and almost all respondents have sought to do the best they could in the situation. While only 30% reported having any previous experience with online teaching, 80% reported now using Zoom – with the videobased software being the most popular software programme for teaching. There is a range of other programmes used with large variation for both synchronous and asynchronous lecturing, live interactive teaching, organisation of activities, communication, assignments, written communication, polling, and feedback-based teaching and document sharing.

However, the analysis of the data demonstrates that the university teachers' digital competence should be still developed. The data reveals that the university teachers' competence in Lithuania before the COVID-19 and after two month of online teaching is, in general, homogeneous. On the

one hand, the university teachers obtained the optimal level of competence in media and equipment, media literacy and teaching online motivation even before the pandemic. Still, even though the emergency situation has caused some slight change in the digital university teachers' digital competence, they strongly require specific professional knowledge in courses, didactics and instructional design, Learning Management Systems and e-moderation.

Hence, the overall digital teaching competence of academic staff who participated in the empirical study is determined as non-sufficient. The most important development areas are creating and editing digital material, using different classroom technologies, finding and using different learning tools and evaluating student performance in digital learning environments. The second most important are using blogs and wikis, social bookmarking, finding authentic web based content, using video and audio content, understanding privacy and copyright issues. Interestingly, the evaluation of the student performance in the digitalized learning environments is the most significant development issue.

Conclusions

The findings of the present research on the inter-relationships between competence, experience, digital competence of university teachers and professional digital competence of teachers serve as a source of determination of what digital teaching competence of university teachers is.

The empirical findings of the research allow drawing the conclusions that the digital teaching competence of academic staff who participated in the empirical study is of the insufficient level.

A new research question has been formulated: How to organise on-line training for university teachers in order to increase the level of digital teaching competence?

The present research has *limitations*. The inter-connections between competence, digital competence of teachers and professional digital competence of teachers have been set. Another limitation is the empirical study conducted by involving only 120 university teachers from Lithuania. Therein, the results of the study cannot be representative for the whole area. Nevertheless, the results of the empirical study may be used as a basis of analysis of use of on-line training for academic staff in other higher education institutions. If the results of other institutions had been available for analysis, different results could have been attained. There is a possibility to continue the study.

Further research tends to focus on statistical analysis of the collected data. The search for relevant methods for evaluation of university teachers experience is proposed. Empirical studies to compare and teachers' experience before and after on-line training for trainers are emphasized. And a comparative research of more countries could be carried out, too.

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