Chapter 11
E-learning Competencies for University and College Staff

Magdalena Roszak, Iwona Mokwa-Tarnowska, and Barbara Kołodziejczak

11.1 Introduction

An interest in enhancing education with online technologies has grown considerably over the last decades (Jump 2011; Kirkwood and Price 2013; Walker et al. 2012). With the emergence of new, more interactive web-based systems, behaviourist ideas, which have substantially affected a face-to-face classroom and virtual learning environments, are being slowly replaced with other paradigms which seem to engage students more effectively in the learning experience. There is a gradual move towards constructivism (Koohang et al. 2009), constructionism (Papert and Harel 1991) and connectivism (Siemens 2005), which can be seen in the affordances of LMS tools and the approach to the instructional design of various new online courses, e.g. MOOCs provided by the UK's Open University (Freitas et al. 2015; Mokwa-Tarnowska 2015b).

The focus on the collaborative nature of knowledge development and the availability of multilayered interactions between and among tutors, course participants, course content as well as course structure allow designing resources and activities which shift control to students and provide them with additional learning opportunities, increasing their engagement (Mokwa-Tarnowska 2015a). New environments structured around learner-centred pedagogies and Web 2.0 technology provide a

M. Roszak (✉) · B. Kołodziejczak
Poznan University of Medical Sciences, Poznań, Poland
e-mail: mmr@ump.edu.pl; bkolodziejczak@ump.edu.pl

I. Mokwa-Tarnowska
Gdańsk University of Technology, Gdańsk, Poland
e-mail: imtarn@pg.edu.pl

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variety of methods and tools to build mental models in a more effective way than traditional, face-to-face classrooms (Seppälä and Yajima 2017). However, the synergy that can be gained from any use of web-based education can only be attained by staff who are equipped with an appropriate level of knowledge and understanding, as well as pedagogical and ICT skills to supervise the learning process in such an environment.

The chapter aims to show how post-secondary school teachers and academics who are either involved in e-learning or are interested in adding an online component to the curricula of their courses perceive web-enhanced classes and e-learning. Moreover, it tends to analyse whether they can engage their students in an active and collaborative development of knowledge and skills through the use of online tools. The competencies necessary for staff to develop an effective online programme are of utmost importance, and they are also addressed.

The comparative research targeted the staff of Poznan University of Medical Sciences (PUMS), Gdansk University of Technology (GUT) and West College Scotland (WCS) to assess how staff with a varied level of ICT skills, ranging from advanced to basic, are able and willing to work in an online environment. The presented hypotheses are supported by survey results and discussions with the staff. The data were collected from June 2017 to May 2018. The research on teachers and academics competencies required to provide quality online education is in its initial stage. However, its findings have clearly identified a range of areas that must be targeted to make online education a successful endeavour.

11.2 Online Developers' and Tutors' Competencies

11.2.1 Initial Criteria

Online learning requires its participants, course suppliers, instructional designers, online pedagogy specialists and learners (Kołodziejczak and Roszak 2017), to meet certain initial criteria, i.e. to have the competencies necessary to perform their specialised tasks (Morze and Kuzminska 2017; Roszak and Kołodziejczak 2017). This means that every online course developer and tutor must now be able to handle multimedia and interactive components as the majority of web-enhanced materials contain multi-format resources and activities. The areas of special expertise include learning group management, content development, knowledge and skills evaluation, one-to-one and one-to-many communication, support structures and ways to motivate students to work effectively (Mokwa-Tarnowska 2017a, b, Noskova et al. 2017; Roszak et al. 2016). Thus, well-trained staff should possess varied pedagogical and ICT competencies, which, depending on the fields educational institutions specialise in, are often neglected and marginalized.

11.2.2 ICT Competencies

There are a number of ICT competencies which developers of attractive and engaging educational materials should have. They need to be familiar with a broad and continuously expanding set of technologies for streamlining software developers' work and machine communication, as well as for content creation, collaborative work and group management. Technological advances are so broad, rapid and dynamic that educators have to continuously reflect on their teaching in a technology-based environment and their own development in order to identify areas for growth and improvement (Bromer 2017).

11.2.3 Online Publication

To start with, to be able to create effective resources, they should understand the methods of online publication such as embedding in an HTML, inserting a video file as an integral part of an HTML5 file and streaming – playing up-to-date information downloaded through the network to buffer the recipient's computer. What is more, the proper selection of the most appropriate graphics and multimedia tools also requires from online specialists to possess specialised knowledge and considerable experience. Finally, the knowledge of affordances of Internet tools helps prepare various activities that stimulate students to engage in the learning process (Becker et al. 2017; O'Callaghan et al. 2017).

11.2.4 Modifications

Moreover, electronic resources prepared for online classes may and should be modified during the course. Changes in the infrastructure (e.g. purchases of software, literature, hardware) are likely to affect the course content. So if any modifications have to be made, they have to be introduced within a very short time period, and students should be immediately notified about the latest additions and new options available. Thus, being professionally equipped with versatile knowledge about modern technologies and their functionalities, e-learning specialists do not have to use third-party suppliers to assist them in updating and upgrading the learning content.

11.2.5 Community of Learners

In addition, creating a community of learners is very important in e-learning. Course participants can be members of more than one group (at their own faculty or elsewhere), and tutors can teach more than one subject (including interfaculty courses).

Some LMSs allow grouping participants and establishing learning areas (Kołodziejczak et al. 2014). Therefore the tutor's ability to use advanced setting options will result in collaborative opportunities for their students, which result in them being able to develop also a wide variety of soft skills, ranging from communicative, critical thinking to time management and leadership.

11.2.6 Assessment

The assessment of the students' knowledge and skills made during tests and exams and on the basis of their overall performance when preparing projects or performing online tasks requires a significant amount of time and organisation from the tutor (Tobin et al. 2015). If they are trained to effectively use the virtual learning environment that they have chosen for their courses, the available advanced functionalities will allow:

- Preparing a vast number of multiple choice, true/false, matching, short answer, fill-in-the blank and computational questions
- Generating a set of random questions from the course bank
- Organizing and supervising the examination process
- Evaluating hundreds of written works sent to electronic mailboxes or other storage media
- Distributing the results and storing them in the LMS or the faculty data banks

11.2.7 Pedagogical Skills

There are also numerous pedagogical skills that an online tutor should have. Involving course participants in the learning process which takes place in a virtual classroom, i.e. increasing their willingness to actively participate in various course activities as well as motivating them to learn on their own or in a group at a steady pace, is the responsibility of an online tutor. If the learning design of a course with an e-learning component or of a web-enhanced course does not include pre-emptive or responsive tutor support structures, the learning outcomes may not be as assumed during the preliminary development phase (Allen 2016; Kołodziejczak et al. 2015; Krajka 2012). A move from an instructivist online classroom towards a constructivist one which has also activities designed according to constructionist and connectivist principles, that is, towards a more engaging, student-centred educational environment, can only be made by experienced educators who specialise in online pedagogy.

11.2.8 ICT Competencies and Pedagogical Skills

Designing a learning environment which is les instructive in nature is not an easy task. It requires from an educator to acquire a deeper understanding of other pedagogies and the ways of their application to online education. Even the best resources and activities from a technical point of view, prepared by highly qualified ITC specialists who can apply innovative solutions and use modern, state-of-the-art technologies, are likely to be ineffective and cause a number of problems if the pedagogical aspects of instructional materials and course design are not taken into consideration. A lack of pedagogical preparation has been identified as a problem among online course developers with an IT background, and it may contribute to a high drop-out rate and lead to the attendants not meeting the course aims or objectives or both (Mokwa-Tarnowska 2013). On the other hand, the lack of expertise in ICT on the part of course developers may lead to users developing a negative attitude towards e-learning. Thus, instructional designers who specialise in innovative pedagogies, and who do not possess advanced technical skills, should be supported by ITC specialists who are able to develop a well-functioning environment and tailor it to the pedagogical paradigm that will meet the learners' needs (Ren-Kurc et al. 2012:203–207). Therefore a great emphasis should be placed on the continuous improvement of developers' and tutors' qualifications in teaching methods and technologies most effective in e-learning, blended learning and web-enhanced learning (Kołodziejczak and Roszak 2017).

11.2.9 Continuous Training

This means that training courses for university staff should target various fields of expertise, helping their attendees to upgrade their skills and develop professionally to be able to address growing and changing demands. A range of training routes, for advanced professionals, intermediate users and inexperienced staff willing to become online tutors, must emphasise practical training in education, technology and innovation. A vast majority of academic and college staff in Poland and other countries have not yet had the opportunity to participate in any e-learning courses. Thus, for highly qualified experts who deliver classroom-based lectures, tutorials or workshops, it would be a valuable experience to immerse in any educational programmes offered in an online environment (Roszak and Kołodziejczak 2017). By doing it, they could gain hands-on experience and appropriate skills necessary to successfully engage in e-learning as developers and supervisors. Supported by a thorough introduction to established educational theory and thinking and exposed to new solutions and ideas, they will be able to create materials tailored to their students' needs, monitor their progress and stimulate them to learn actively (Mokwa-Tarnowska 2017a). Training programmes run by experienced educators, and ITC specialists can also help e-learning staff become self-directed learners who will be willing to continuously upgrade their skills and knowledge.

11.3 Online Teaching at Poznan University of Medical Sciences, Gdańsk University of Technology and West College Scotland

Poznan University of Medical Sciences (PUMS, Poland) is a leading medical university, and with just under 1500 academics, it is currently recognized as the largest educational, research and clinical centre in Poland. The university's total student enrolment is 7000 students, including nearly 1000 international undergraduates (Centre for Medical Education in English). Following a 1-year project, in February 2010, the Department of Pathophysiology and the Department of Computer Science and Statistics made available an exam platform to deliver online tests in pathophysiology. PUMS's Centre of Innovative Teaching Methods, established in 2011, supports the use of technology for the enhancement of student learning. It assists the four faculties in designing and delivering e-assessment, analysing its results and maintaining the exam standards across the university. In 2014 the Department of Pathophysiology was the first university unit to introduce web-enhanced learning. The department's LMS called ESTUDENT is used for the administration and delivery of multimedia educational materials, as well as student-student and student-tutor communication. It supports learner autonomy and personalisation and provides a new learning experience through interactive digital technologies. Its Medical E-education Lab coordinates all e-learning activities in the pathophysiology area and offers training sessions for all staff involved in online teaching. Since the academic year 2017–2018, 11 staff of the Department of Pathophysiology have been running a number of online lectures and seminars for over 800 students.

Gdańsk University of Technology (GUT, Poland) has a domestic and worldwide reputation of being a significant scientific centre. Its nine faculties give opportunities to create a superior climate for intellectual and personal growth. They provide education for more than 25,000 students offering undergraduate, postgraduate and doctoral courses. The total number of academics amounts to approximately 1200. Lectures, seminars and laboratory workshops that run in a traditional face-to-face environment are a dominant form of teaching, online assignments and courses being a marginal percentage of the workload assigned to the students. Whichever educational paths GUT students are offered depends on the faculty board and the directors of the supportive centres in the case of language, mathematics and physical education, as well as on individual academics. There are no full-time courses run online, and only some include online modules or are enhanced by web-based materials. The latter category could be assumed to be the major field of e-learning activity at GUT. The statistics are difficult to obtain because it is not necessary for the academics to report the exact composition of their courses to the authorities. The syllabus must include a division into traditional and online learning only if the course is provided in a blended format – and such types are infrequently delivered at GUT.

Created on 1 August 2013 by the merger of Clydebank College, Reid Kerr College in Paisley and James Watt College in Greenock, West College Scotland (WCS, United Kingdom) is a further education institution with 30,000 students and

1200 staff, which makes it one of the liveliest educational institutions in Scotland. It offers a wide variety of undergraduate programmes and vocational training, full-time, part-time, evening and distance learning, designed to satisfy varied needs of different-age students and job seekers, including those wanting a career change. The college promotes distance learning and extends course offer by adding web-based components developed by its experienced and devoted staff from the technology and innovation unit. So far some online courses have also been taught, including an optional course on Health and Safety at Work Regulations and compulsory introductory courses such as Copyright Law, Online Searching, Study Skills and Touch Typing Tutor. It is worth adding that Microsoft has accepted West College Scotland as a Microsoft Showcase School.

11.3.1 Research Methods

The qualitative and quantitative research into the nature of web-enhanced classes and blended courses at various educational institutions is in its initial stage. Upon completion the research findings will be published and available to the academic community. Generally, it targets impact on an increase in student competencies, quality of online teaching and learning (Półjanowicz et al. 2014), the tutor's role in a versatile educational environment and an interest in a move towards e-learning and incorporating more Internet technologies into education. Students' and teachers' opinions shown in comments presented in class and outside it, as well as open-ended questions in surveys will help to uncover trends to be further tested using quantitative research, which has just been initiated (Roszak et al. 2018). Two basic tools have been used so far to produce a qualitative analysis: direct observation and group discussions. The quantitative research whose results are presented in this paper involved surveys carried out in June and July 2017 and May 2018. The research questions were as follows:

- How do teachers and academics perceive e-learning and web-based education?
- How do teachers and academics assess their readiness for teaching in online environments?
- Do faculty and college staff understand the difference between teaching in a traditional and online environment?

It can be assumed that the composition of the study group (Table 11.1) is quite homogeneous with respect to many factors: intellectual capacity, interest in innova-

Table 11.1 Respondent distribution by institution

Institution	Count	Cumulative count	Procent	Cumulative procent
PUMS	75	75	60.5	60.5
GUT	44	119	35.5	96.0
WCS	5	124	4.0	100.0

Source: Own work

tive learning and quality teaching and teaching experience. The respondents' ICT skills necessary to develop online materials differ substantially and depend on their qualifications. At Gdańsk University of Technology, 18 respondents are ESP teachers, and 26 academics are science and engineering degree holders. Poznan University of Medical Sciences respondents consist of professors, assistant professors, senior lecturers and assistants, all of them are academic teachers and none of them are clinicians. West College Scotland staff are teachers.

11.3.2 Statistical Analysis

The data are presented as medians, interquartile ranges (lower quartile, upper quartile) and minimum and maximum values or percentage, as appropriate. For comparison of the two groups, the Mann-Whitney U test was applied. For comparison of the three groups, the Kruskal-Wallis test and the Dunn's post hoc test were used. The nominal data were analysed with the chi-square test or the Fisher-Freeman-Halton test. All the results were considered significant at $p < 0.05$. Statistical analyses were performed with STATISTICA 12.0 PL (StatSoft Polska, Kraków, Poland) and StatXact 11.0 (Cytel Inc., Cambridge, MA, USA).

11.4 Findings

A two-stage analysis was conducted to clarify the findings. The first one involved a comparison of all the data collected at the three targeted institutions. The second one focussed on a comparative analysis of the opinions expressed by the staff from the two Polish universities – GUT, which offers courses in science, technology and business, and PUMS, whose course curricula are structured around non-technical and non-ICT subjects. The questionnaire included 15 close-ended and 6 open-ended questions. The analysis provided below is based on the answers to nine close-ended questions which can be divided into three categories, labelled as follows:

- Respondents' participation in courses, training programmes and workshops on e-learning as well as respondents' self-evaluation of knowledge and skills in this area (questions 1, 2, 3 and 4) (Table 11.2, Figs. 11.1 and 11.2)
- Development of online educational materials and frequency of their use in post-secondary school education (questions 8, 9 and 11) (Table 11.3, Fig. 11.3)
- Collaborative work in an online environment and assessment of its effectiveness (questions 14 and 15) (Table 11.4)

Substantial differences can be noticed in the answers provided by the PUMS and GUT staff to question 1 ($p < 0.05$, Fig. 11.1), which focussed on completed courses and workshops on e-learning (Table 11.2), whereas there is virtually no difference between the GUT and WCS respondents ($p > 0.05$). The medical university academ-

Table 11.2 Analysis of the first category: questions 1, 2, 3 and 4

No. question		PUMS	GUT	WCS		
Scale: 0–4	[a]CB	n = 75	n = 44	n = 5	p-value	Interpretation
1. Completed courses/ workshops on e-learning	3	[b]Me = 1	Me = 3	Me = 3	0.003	Difference between PUMS and GUT (p = 0.008)
	2			–	0.002	Difference
4. Willingness to attend courses/workshops on e-learning	3	Me = 4	Me = 3	Me = 3	0.145	No difference
	2			–	0.074	
2. Knowledge about how to teach in an e-learning environment	3	Me = 1	Me = 2.5	Me = 1	0.203	No difference
	2			–	0.096	Difference
3. Skills in developing e-learning materials	3	Me = 2	Me = 2	Me = 2	0.972	No difference
	2			–	0.831	

Source: Own work
[a]CB = comparison between educational institutions
[b]Me = median

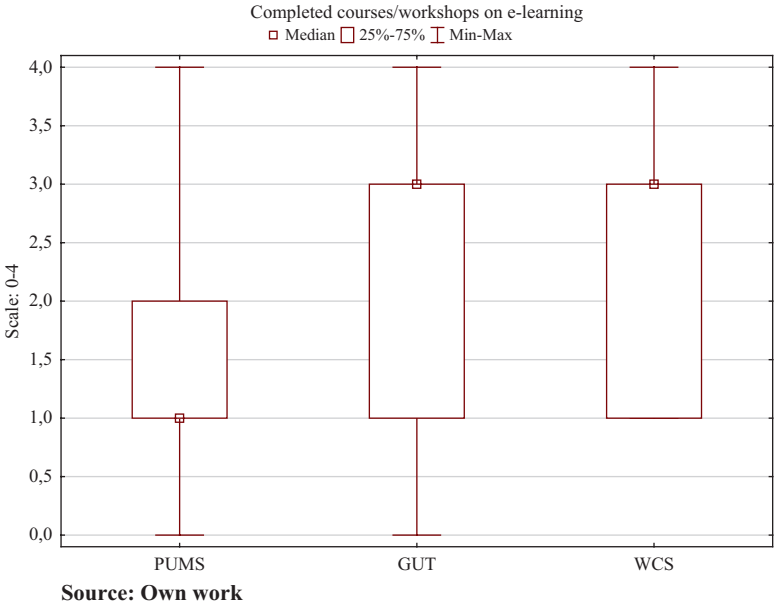


Fig. 11.1 Respondents' participation in courses, training programmes and workshops on e-learning (question 1). (Source: Own work)

ics rarely participated in training programmes on e-learning (median 1 = no) when compared to the GUT and WCS staff (median 3 = yes, a few). Similar responses are expected from other non-technical higher education institutions which do not provide ICT support or which do not run ICT courses. Universities of science and

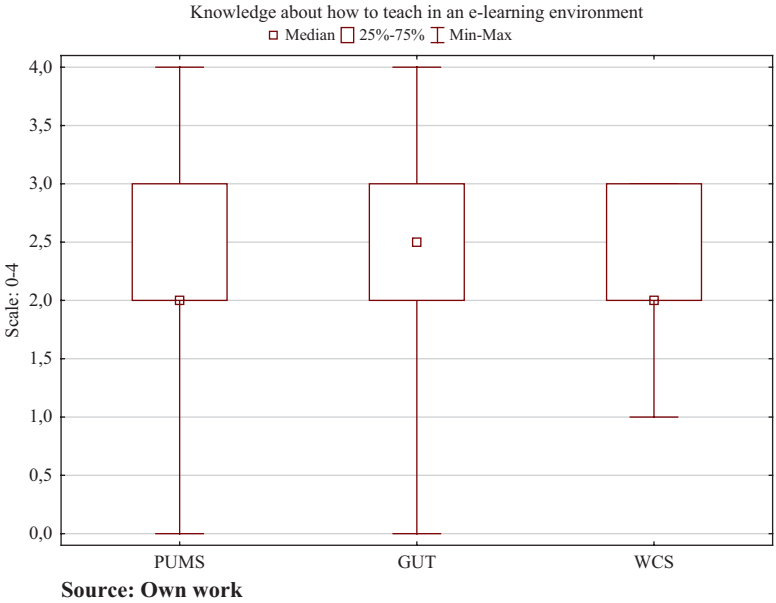


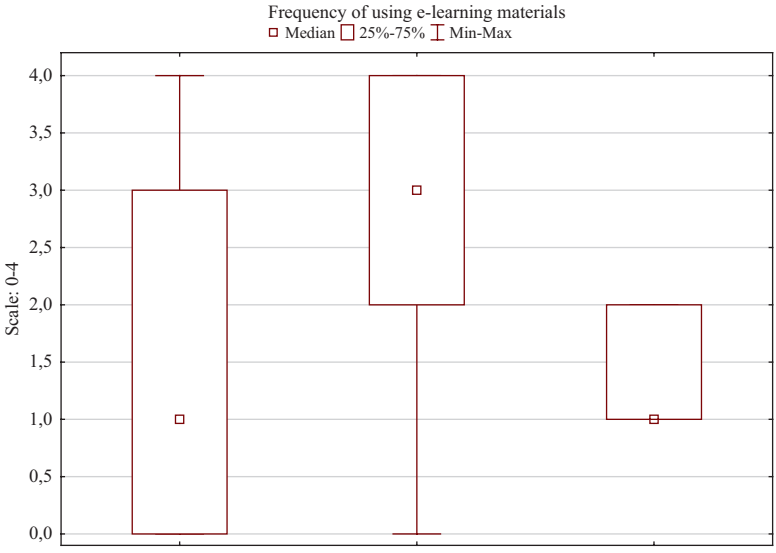
Fig. 11.2 Respondents' self-evaluation of knowledge on e-learning environment (question 2). (Source: Own work)

Table 11.3 Analysis of the second category (questions 8, 9 and 11)

No. question		PUMS	GUT	WCS		
Developing e-learning materials	CB	n = 75	n = 44	n = 5	p-value	Interpretation
8. Have you developed your own e-learning materials?	3	39.2%	79.6%	60%	< 0.001	Difference between PUMS vs GUT ($p < 0.001$)
YES [%]	2			–	< 0.001	Difference
9. Have you developed your own web-based learning materials for use in class?	3	34.4%	72.7%	25%	< 0.001	Difference between PUMS vs GUT ($p < 0.001$), GUT vs WCS ($p < 0.001$)
YES [%]	2			–	< 0.001	Difference
11. Frequency of using e-learning materials	3	Me = 1	Me = 3	Me = 1	< 0.001	Difference between PUMS vs GUT ($p < 0.001$)
Scale: 0–4	2			–	< 0.001	Difference

Source: Own work

technology are usually better equipped, and their staff are more qualified to deliver training in ICT and online teaching. This results in them being able to support academics and teachers by addressing their ICT needs necessary for e-learning. Other universities assist their employees by establishing e-learning centres or pro-



Source: Own work

Fig. 11.3 Frequency of using e-learning materials in post-secondary school education (question 11). (Source: Own work)

Table 11.4 Analysis of the third category (questions 14 and 15)

No. question		PUMS	GUT	WCS		
Online collaborative projects	CB	n = 75	n = 44	n = 5	p-value	Interpretation
14. Would you like to supervise online collaborative projects?	3	38.9%*	27.3%*	0%*	0.063	No difference
		54.2%**	50%**	100%**		
YES [%]*, I do not know [%]**	2			–	**0.041**	Difference
15. Do you think that online collaborative projects can be effective? Scale: 0–4	3	Me = 3	Me = 3	Me = 1.5	0.458	No difference
	2			–	0.922	No difference

Source: Own work

vide training through government funding in the form of grants and projects. Commercial workshops are too expensive, so they are rarely offered for academics and teachers. There is no significant difference ($p > 0.05$) as far as the respondents' willingness to participate in training programmes on e-learning is concerned (Table 11.2, question 4). All the staff would like to improve their knowledge about teaching in an online environment and learn appropriate skills to develop online modules. The median for WCS and GUT is 3 = Probably yes and for PUMS is 4 = Definitely yes.

Assessment of knowledge about how to teach in an e-learning environment shows no significant differences between PUMS and GUT ($p > 0.05$) (Table 11.2: question 2). The technology university staff consider their knowledge in this field to be better than the medical university academics (Fig. 11.2). However, the difference is not substantial because the median for PUMS is 1 = Slightly dissatisfied and for GUT is 2.5 (3 means Moderately satisfied). It must be stressed that the p-value is greater than the significance level but close to 0.05. It seems that the GUT staff should have assessed their knowledge higher than they did in the survey. This shows that the level of understanding how to teach on an online course is still insufficient and needs to be improved through, e.g. workshops. The comparison of the answers (question 2) provided by all the institutions does not show statistically significant differences ($p > 0.05$).

The analysis of the answers to question 3 (on a 0–4 scale), addressing skills needed to develop e-learning materials, does not indicate significant differences between the institutions either ($p > 0.05$, median 2 = Average). It was expected that the technology university staff would regard their competencies as high, and it appears that all the respondents rated them similarly.

The analysis of the data on developing online materials to enhance traditional classes (question 9) and creating stand-alone online modules (question 8) shows significant differences between the three institutions ($p < 0.05$) (Table 11.3). The results are consistent with the findings based on questions 1 and 2 (Table 11.2) and prove that technology and science universities, by their nature, are better prepared to handle e-learning than non-technical ones. The GUT staff that develop their own online materials amount to 70–80%, whereas the percentage of the PUMS academics ranges from 34% to 40%. The structure, content and embedded interactivity of these materials are not known, neither are the tools used to develop them. Further research is going to be carried out into their nature, which may result in reinterpreting the findings.

There is a statistically significant difference ($p < 0.05$) between the answers to question 11 (frequency of using e-learning materials, Fig. 11.3) given by the PUMS and GUT staff, median 1 = Every 2–3 months and median 3 = Every 2–3 weeks, respectively. However, there is no difference between the respondents from PUMS and WCS ($p > 0.05$). This is in line with the answers to questions 8 and 9.

Table 11.4 includes data on the third category (questions 14 and 15), which involves online collaborative work. Taking into account the institutional response, it can be seen that all the three share the same attitude ($p > 0.05$) towards the effectiveness of online projects (question 15). Their staff think that they may be effective (median 3 = Very, 2 = Moderately). The analysis of the responses to question 14 (answer options: Yes, I do not know, No) shows no significant differences between the institutions ($p > 0.05$). However, the p-value is higher than the significance level but close to 0.05. It must be emphasised that a vast number of the respondents chose the I don't know answer (50–100%) when asked to expresses their attitude to engaging students in online collaboration. The comparison of the responses only from the Polish institutions (PUMS and GUT) indicates that the differences between them are significant ($p < 0.05$). The PUMS staff are more willing to supervise online col-

laborative work than the GUT staff, which is very interesting because online collaborative projects are rarely incorporated into the curricula of medical courses. The PUMS academics see their potential in developing knowledge and skills required from doctors and specialists in health care.

11.4.1 Summary of Results

The research has shown that the surveyed university and college staff see the need to improve their e-learning competencies, including ICT and pedagogical, through attending workshops and courses. Increased knowledge and skills will allow them to meet the requirements of today's students and employers (Roszak et al. 2018). Regardless of the educational institution, the respondents consider their competencies necessary to teach in an e-learning environment to be average. The technology university staff more often participated in training focused on ICT skills, online tools and teaching on an online course. They also developed their own e-learning materials twice as often as the others. A greater experience in creating online modules resulted in them using such resources and activities more regularly. The GUT academics stated that they used online materials at least 2–3 times a month, whereas the PUMS and WCS staff did it once every 2–3 months, which means twice a semester. As was explained in the previous section, university of science and technology employees have more practical experience in the use of ICT. Thus, they have less fear of using new teaching practices in a technology-rich environment. This assumption was verified in this research study. The quality of online modules they had developed was not targeted in the survey, but it is known that quantity has an effect on quality together with knowledge and experience.

The surveyed staff expressed a positive attitude towards online collaborative work, recognising its potential high effectiveness. However, they were reluctant to supervise online group projects in the future. At least half of all the respondents chose the I don't know answer to the question about willingness to be an online tutor assisting students in their collaborative work, which can be attributed to a lack of experience.

11.5 Conclusions and Final Remarks

In order to teach in an e-learning, blended learning or web-enhanced environment, course developers and tutors need to have certain additional competencies based on the nature of the LMS service and the pedagogy around which their teaching is structured. In addition to professional knowledge and organizational skills, which are indispensable for every teacher in a traditional classroom, they must have a number of competencies that merge ITC skills with pedagogical skills and

knowledge about legal and ethical issues, e.g. copyright laws, identity verification, and data validity. They are needed to:

- Compile and publish professional materials, including multimedia resources
- Create engaging and effective activities and student-friendly resources to develop various hard and soft skills
- Prepare knowledge assessment, particularly in the form of tests, outcome analysis, stealth learning
- Manage effective student-tutor, tutor-group of students and student-student communication
- Archive learning resources, evaluation results, contents published on the forum

Some developments and activities can be supported by university IT departments or other technology and innovation units, whereas others are the sole responsibilities of online tutors.

The research has shown that there is a great demand for training ranging from online teaching methods, through tools and techniques of creating quality materials, to supervision and group management in an e-learning environment. Many universities and colleges in Poland have not yet introduced uniform regulations concerning funding blended learning and e-learning programmes. Financial support for developing online interactive multimedia resources, which requires a great amount of effort and commitment from authors and tutors, is limited. Pre-emptive and responsive support coming ICT and online pedagogy specialists is insufficient. A lack of knowledge about how to teach online often results in staff perceiving a move towards web-enhanced education as a threat leading to job reduction. University and college authorities sometimes treat e-learning as a possibility to reduce high running costs. Once this belief is eradicated, and various support structures are introduced, universities will not lag behind.

Nowadays students usually treat the Internet as the main source of information and data and knowledge. Thus, if universities and colleges do not equip them with best study opportunities encompassing skills and knowledge development in new technology-enhanced environments, their learning experience will be incomplete, chaotic and devoid of correct reasoning. As the research has shown, teachers are ready for new challenges, but without comprehensive support, they will not be eager to use innovative methods and techniques, and qualitative changes will not be possible.

11.5.1 Final Remarks

Blending and enhancing face-to-face classes with Web 2.0 technologies, as well as converting classroom or instructor-led training to e-learning, can lead to a very successful outcome if the pedagogical approach is based on the principles of constructivism, constructionism and connectivism. These paradigms support learner autonomy and personalisation, community integration and social interactions,

cognitive processing strategies, problem-solving through interactive processing of information, peer review and collaborative learning by doing, context-based learning and research- and project-based learning. A carefully structured environment can result in better learning outcomes measured by instruments available through the use of online tools. It is not sufficient to replace some traditional resources and activities that have always taken place in the classroom with their equivalents developed in a new environment, using innovative technologies. An online component for use in class or outside it has to be incorporated into the learning design in a meaningful way so as to enhance and improve the learning experience and achieve a synergistic effect.

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