



<https://doi.org/10.31261/IJREL.2022.8.1.03>

Eugenia Smyrnova-Trybulska

University of Silesia in Katowice, Poland
<https://orcid.org/0000-0003-1227-014X>

Iryna Sekret

STARTINFORUM International Project Management and Business Consultancy, Turkey
<https://orcid.org/0000-0002-4802-113X>

Nataliia Morze

Borys Grinchenko Kyiv University, Kyiv, Ukraine
<https://orcid.org/0000-0003-3477-9254>

Elsbeth McKay

Cogniware, Cogniware.com.au, Melbourne, Australia
<https://orcid.org/0000-0001-7547-9616>

**Evaluation of the MOOCs Quality
and Its Effectiveness for Teachers’ Training in the Field
of Digital Competences and Their Use in Education:
A Case Study**

Abstract

This study presents the research results obtained after the assessment of the digital competences of the pre-service and in-service teachers after their completion of the MOOC “Contemporary ICT Tools and Innovative Methods of Creative Education”. The paper provides a short description of the MOOC, requirements to pass the course and analysis of the learning outcomes through the students’ self-evaluation and feedback. The MOOC was developed in Polish and English within the project “MOOCs for Sciences of Education” and hosted on the Polish MOOCs platform Navoica (www.navoica.pl) within the framework of the competition, initiated by of Ministry of Education and Science of Poland and National Center for Research

and Development (NCBR – Narodowe Centrum Badań i Rozwoju) on “Direction to the MOOC”. Keeping in mind that Massive Open Online Courses (MOOCs) have developed into a mainstream for universities, education reformers and start-up companies, especially in the time of the COVID-19, the study is believed to contribute to the development of the MOOC pedagogy, and address the question of the MOOCs effectiveness for students’ learning outcomes and satisfaction. The experimental MOOC “Contemporary ICT Tools and Innovative Methods of Creative Education”, which was aimed at enhancing teachers’ digital competences, contained 8 modules, and was attended by more than 90 students through its 1st edition in 2020–2021. The conclusions of the MOOC in focus and overall recommendations on enhancing the MOOCs effectiveness for formal education and learning outcomes have been evaluated based on the research data and provided accordingly. The selected statistical analyses and the data comparisons were made using Wilcoxon’s test at the significance level $\alpha = 0.05$. The normality of the distributions of the studied variables was checked using the Shapiro Wilk test.

Key words: MOOCs; education, digital competences; teachers; ICT-tools in education

In the changing world of the dynamic development of the educational system in all countries, contemporary ICT tools and innovative methods of creative education play an exceptionally important role. In this context, teachers’ training and raising their competences in ICT technologies as well as their implementation in the formal education gain a special value due to the fact that digital competences have already become an indispensable part of the professional profile of an effective teacher.

For this purpose, it is worth using various methods of training, including remote techniques, which are of exceptional importance especially in the time of the restricted accessibility of traditional education.

MOOCs with their openness and availability for all those who would like to continue their education despite their location and busy schedules, is a good option for pre-service and in-service teachers to gain knowledge and skills in education and related topics from international experts.

Considering a big number of MOOCs offered, it is important to evaluate the suggested programs from the point of view of their effectiveness, quality and educational value.

With this purpose in mind, the study presents the research results obtained after the assessment of the digital competences of the pre-service and in-service

teachers who completed the MOOC "Contemporary ICT Tools and Innovative Methods of Creative Education".

The paper provides a short description of the MOOC, requirements to pass the course and analysis of the learning outcomes through the students' self-evaluation and feedback.

The MOOC in focus was developed within the project "MOOCs for Sciences of Education" and hosted on the Polish MOOCs platform Navoica (www.navoica.pl) in the framework of the competition, initiated by of Ministry of Education and Science of Poland and National Center for Research and Development (NCBR - Narodowe Centrum Badań i Rozwoju) on "Direction to the MOOC". The MOOC was available in Polish and English.

Keeping in mind that Massive Open Online Courses (MOOCs) have developed into a mainstream for universities, education reformers and start-up companies, especially in the time of the COVID-19, the study is believed to contribute to the development of the MOOC pedagogy, and specifically address the question of the MOOCs effectiveness for students' learning outcomes and satisfaction.

The research questions RQ1-RQ5 of this study are:

RQ1. How did respondents rate their competence in adapting and using digital technologies in their teaching before and after participation in the MOOC?

RQ2. How do respondents rate their skills and effectiveness in using ICT and innovative teaching methods in designing the educational process and / or at work before and after participation in the MOOC?

RQ3. What is the level of knowledge of the different types of ICT tools and innovative educational methods in learning and learning practice (online) (based on self-assessment) before and after participation in the MOOC?

RQ4. What main challenges do respondents think are involved when adopting or developing ICT aided learning practice before and after participation in the MOOC?

RQ5. What were the participants' expectations before starting the course and their opinions after completing it?

The hypotheses H1-H3 of the research are:

H1. Taking the MOOCs on Digital Competences in Education helped the students to enhance their competences in adapting and using digital technologies in their teaching, and the difference in the level of their competences before and after the course is significant.

H2. The students' level of skills and effectiveness of using ICT and innovative teaching methods in designing the educational process and / or at work increased after participation in the MOOC.

H3. Based on the students' self-assessment, the level of the students' knowledge of different ICT tools and innovative educational methods in learning and online learning practice has risen after taking the course.

1. Research Background

Due to the present evidence, the provision of MOOCs in Europe and other continents tends to grow. Together with that, the implementation of MOOCs may be hindered because of diverse languages, cultures, settings, pedagogies and technologies (Jansen, & Goes-Daniels, 2016).

Among benefits of MOOCs which may serve for different learning purposes are the following (Patru, & Balaji, 2016):

1. Courses are offered free-of-charge to any number of people, anywhere and anytime, therefore, MOOCs enable access to higher education and beyond for people who cannot afford a formal education and are disadvantaged.
2. MOOCs can reduce the disconnect between the skills and aptitudes of the majority of university graduates and the needs of the industry sector in many countries. This disconnect is triggering huge unemployment amongst youths and adults, particularly women.
3. MOOCs can be useful in providing job-oriented training and skills development.
4. MOOCs emerged from the open education movement. As such, they enable free access to high-quality content and resources, which might be too costly for higher education institutions in developing countries to produce. (Patru, & Balaji, 2016; p.5–6).

With the development of e-learning, researchers and practitioners have been more and more intrigued by the potential it provides in terms of a big variety of teaching models, learning opportunities and perspectives, opening new horizons for more and more students to reach their aims in education and career (Aldahmani, Ali Al-shami, Adil, & Sidek, 2020).

Introduced in 2008 by David Cormier, nowadays MOOCs are classified as online courses designed for large numbers of participants, available to anyone everywhere as long as there is an Internet connection, being open to anyone and offering a complete / total online course for free (Aldahmani, et al., 2020).

Though, since 2008, there have been many studies discussing MOOCs pedagogy, MOOCs applications and their effects, the literature still lacks sufficient body of knowledge about MOOCs types, how they work, their importance and,

moreover, the practical value of MOOCs for formal education and sustainable learning outcomes (Deng, et al, 2019; Aldahmani, et al., 2020).

The methodological background of this research is comprised by the studies on MOOCs, its pedagogy (Smyrnova-Trybulska et al., 2016, 2019), types and specifics of their application (Deng, et al, 2019), practices of MOOCs in different educational contexts (Koukis & Jimoyiannis, 2018; Sekret et al., 2019), implementation of MOOCs for teachers' training (Koukis & Jimoyiannis, 2018; Gordillo, et al., 2019; Svoboda, Mynaříková, 2021; Smyrnova-Trybulska, Sekret & Morze, 2021), the evaluation of the learning outcomes and students' satisfaction in learning (Razzali, et al., 2016; Sekret, 2021; Smyrnova-Trybulska, Sekret & Morze, 2021; Stracke, & Trisolini, 2021; Segovia García, 2021).

In the area of teachers' training, there have been a number of studies done, concerning different kinds of MOOCs as implemented in the context of the formal and informal education, quality criteria (Molanes-Lopez, Rodriguez-Ascaso, Leton & Perez-Martin, 2021), developing the content of MOOCs and the effects of the education with MOOCs on the students' learning outcomes. Among those to mention is also the study by Cabero-Almenara, Romero-Tena, & Palacios-Rodriguez, (2020) which analyses different proposals made by national and international organizations and institutions on Teacher Digital Literacy, taking into account research as well as the realization of a t-MOOC on Teacher Digital Literacy development (Cabero-Almenara, et al., 2020).

To answer the questions which dimensions should be taken into account for evaluating MOOCs, Stracke, & Trisolini (2021) developed a quality framework as a categorisation scheme to evaluate the quality of MOOCs based on the systematic literature review. As a result of the study, they highlighted four main dimensions to consider for evaluating the quality of MOOCs. They include organizational, technical, social, and pedagogical aspects.

To analyze the quality of MOOCs and the quality of education as a whole, it is important to take into account students' opinions and feedback to consider further shaping the MOOCs content and teaching methods (Segovia García, 2021). Thus, the study by Segovia García (2021) was aimed to find out what students think after finishing their MOOCs in order to detect possible areas for improving the MOOCs quality. Based on the analysis of different tools for measuring the quality of information systems, such as the DeLone and McLean model, a survey was designed and administered to the students who participated in the MOOCs. The qualitative analyses of the students' responses revealed the importance of practical content in the MOOCs.

The researchers also emphasize that „assessing the quality of MOOCs is an important issue for learners since they pay fees for accessing the content (e.g. graded assignments), certificates for the course completion and course credits. One

of the unique advantages of online courses is that all the content can be assessed and analyzed even before the courses are released using various learning analytical and natural language processing tools.” (Cross, Keerativoranan, Carlon, Tan, Rakhimberdina, & Mori, 2019). The experts also stress that “nowadays, education can be done through online medium,” e.g. MOOC, “facilitating access to resources once reserved for the elite of the world, but now accessible in different countries with a purpose to prepare as many employees as possible for the labor market demands of the future” (Condruz-Bacescu, 2018).

2. Methodology of Research

The “Contemporary ICT Tools and Innovative Methods of Creative Education” MOOC contains 8 main Modules:

Module 1: Presentation of graphic materials in the form of infographics and mind / knowledge / concept maps;

Module 2. Theoretical, methodological, and practical aspects of making presentations;

Module 3. Theoretical, methodological and practical aspects of developing a didactic video;

Module 4. Theoretical, methodological and practical aspects of developing a digital story;

Module 5. Theoretical, methodological and practical aspects of gamification;

Module 6. Innovative teaching-learning methods;

Module 7. ICT Tools for E-Collaboration and E-Communication;

Module 8. Online Tutoring. (www.navoica.pl)

Organizational conditions of the MOOC can be presented as follows:

- Duration of the entire course – 10 weeks;
- The number of learning hours throughout the course – 32 hours;
- The number of student’s learning hours during the week – 2–6 hours (4 hours on average) weekly.

Among the main methods of the MOOCs elaboration were: Analyse, Design, Develop, Implement, Evaluate (ADDIE); the Successive Approximation Model (SAM); the Lot Like Agile Management Approach (LLAMA) as well as the Structured Systems Analysis and Design Method (SSADM). The MOOC materials include a lot of various types of visual and multimedia sources – schemes, photos, graphs, screenshots, timelines, videos, audios, first of all primarily prepared

by MOOCs authors and also suitable for disabled people. (Smyrnowa-Trybulska, Sekret, & Morze, 2021).

The main criteria for developing and evaluating the MOOC by the experts included: a) subject of the course and its content, b) methodological and technical aspects (described in more detail by Grodecka et al. (2019: 34–59)

The experts of the Foundation of young science and [Novoica.pl](https://navoica.pl) evaluated the MOOC, its content and implementation into the context of formal education (Smyrnowa-Trybulska, Sekret, & Morze, 2021). In the evaluation, the following aspects were also taken into account:

- Ensuring reliable network infrastructure;
- Using friendly learning tools or platforms;
- Providing interactive suitable digital learning resources;
- Guiding learners to apply effective learning strategies;
- Promoting effective methods to organize the instruction by adopting a range of different teaching strategies;
- Providing instant support services for teachers and learners;
- Possibilities to integrate the course into face-to-face education and create a flexible blended learning environment. (Morze, & Smyrnowa-Trybulska, 2021, p. 30).

In the 1st, 2nd, 3rd edition of the MOOC, the students had to comply with several conditions to pass the course. In order to complete the course, the attendees were required to successfully accomplish at least 51% of the content and assignments. The grading system of the course included a completion of at least one final project assignment as selected among the offered projects (the assignment value is 50%) and a final test (its value is 50%). (<https://navoica.pl>)

Project Assignment 1

“On the basis of the suggested scenario, prepare a presentation about one of the tools, for example Google presentations, PowerPoint, Prezi, Impress or other, which meets the following criteria:

1. The subject of the presentation is consistent with the field of study, for example, pedagogy, or of an educational or tutorial nature. If you are not related to Pedagogy, the subject of the presentation can be any, which is related to your field of study, profession or hobby.
2. Structure: hierarchical, modular, branched.
3. It must contain interactive elements: action buttons (globally on all pages), hyperlink, interactive menu (with the possibility of returning to the menu), quiz, etc.

4. Form of presentation – multimedia (includes various media: text, static and dynamic graphic objects, films (video sequences), sound files (music, voice narratives), tables, charts, animations, etc.) with polysensory influence.
5. The minimum number of slides – 15.

The criteria for assessing the projects are given below:

1. Theme, idea;
2. Interesting, substantively rich content;
3. Clear, logical, branched structure with interactive elements;
4. All multimedia objects are well organized, expressive, readable, and attractive.
The multimedia resources of the author's own work will be rated the highest.
5. Interesting, balanced colors, ensured contrast between the background and the text.
6. The practical usefulness of the project and the possibility of its use.

Project Assignment 2

Project execution plan:

- Choose the topic of the digital story,
- Develop a plot, content,
- Select the tool (s) to compile a digital story,
- Prepare a project in the form of a video,
- Save the file in MP4 or MPG format (size up to 100 Mb)
- The created file is to be uploaded on Google Drive or on YouTube.

In case of difficulties, please use the instructions below:

- Share files on Google Drive
- Uploading a video on YouTube
- Change the privacy settings of the video

In the answer field to the Task, please provide: the title (topic) of the project and a link to the file / movie posted on one of the above-mentioned websites.

Pay attention to such criteria for the performance and evaluation of the task as:

- Attractiveness of the topic,
- Content, interesting plot,
- Correctness of the subtitles,
- Dynamics, clarity of narration, cheerful music.

Do not forget to include the author's details (preferably at the beginning) and the sources used (at the end).

3. Results of Research

3.1 Data Collection

This research is based on the implementation of the quantitative and qualitative methods. That is, the analysis of the data received from the self-evaluation competences surveys (Pre-test and Post-test) using the non-parametric Wilcoxon test. The normality of the distributions of the studied variables was checked using the Shapiro Wilk test.

The full experimental procedure can be presented as follows (Figure 1):

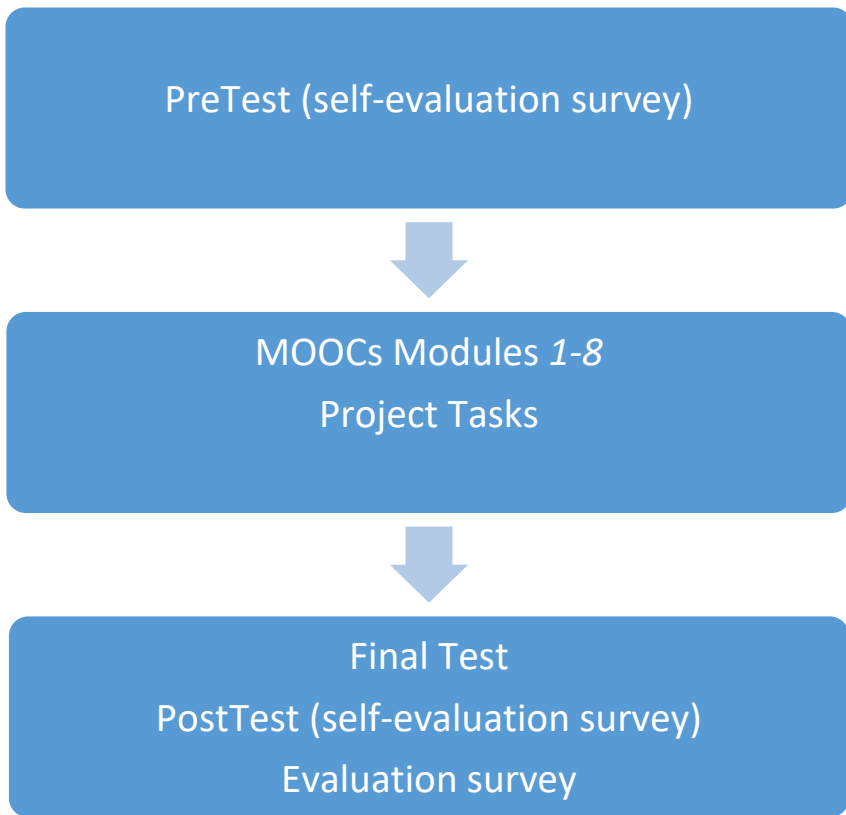


Figure 1. The full experimental procedure stages

The participants were asked for the information to cover seven profile questions (Social metrics): age group; gender; living location; teaching environment; years of experience; study discipline; qualification level.

The research instrument – pretest (self-evaluation survey) consisted of 27-online questions, divided into four separate groups: ICT usage in the participants' teaching (3-items); Digital Literacy (1-item); Use of various online tools (12-items); Concerns regarding online teaching (11-items)

Groups-1 and 3 used a Likert Scale in measuring participants' confidence levels concerning the specific items (0: no answer, 1: I am not sure, 2: I am a bit confident, 3: I am confident, 4: I am very confident, and 5: I rate my competence as excellent). Item-4 (group-2) gave three different descriptions of different literacies (1: the ability to search for information in various digital formats on the Internet, 2: having technical knowledge and skills related to the use of a wide range of digital tools, 3: having the technical and critical analysis skills required to search, evaluate, create and disseminate information using various digital technologies like laptops, smartphones and tablets in everyday life, and 4: None of the above. This item was not included in the post-test analysis. Group-4 was a dichotomous answer with a Yes or No reply (and an occasional Don't Know) (Smyrnova-Trybulska et al., 2022).

3.2 Results

96-participants were involved in the online questionnaire as pre-test groups. In addition, the results of the post-test of 70-participants from Group-1 have been analyzed.

At the end of the course, the learners demonstrated good results in fulfilling the project assignments and the final test of the 1st edition of the MOOC.

The selected statistical analyses and comparisons which were made using Wilcoxon's test at the significance level $\alpha = 0.05$, are presented below.

The normality of the distributions of the studied variables was checked using the Shapiro Wilk test. The variables on the ordinal scale are presented as median (min – max) or median (Q25 – Q75). The categorical parameters are described as n (%). The statistical significance of the studied dependencies and differences was checked at the significance level of $\alpha = 0.05$. The non-parametric Wilcoxon test was used in the study for related variables and for the comparison of the two groups. Dell Inc. software was used for calculations. (2016), Namely Dell Statistica (data analysis software system), version 13. software.dell.com.

Table 1 consists of a descriptive statistics, concerning social metrics:

Table 1

A descriptive statistics, concerning social metrics (Pre1 + Post1)

How old are you? (Pre1 + Post1)		
Age	Number	Percent
from 18 to 25 years old	46	69.7
from 36 to 50 years	7	10.6
from 26 to 35 years	10	15.2
from 51 to 65 years old	3	4.5
Select your gender (Pre1 + Post1)		
Gender	Number	Percent
Man	11	16.92
Woman	54	83.08
In which sector do you study? Or which sector are you most interested in? (Pre1 + Post1)		
Grade	Number	Percent
pedagogical studies	42	65.63
other higher education	13	20.31
high school (K12)	9	14.06
What is your experience (in years) of using ICT in teaching and / or learning? (Pre1 + Post1)		
Experience	Number	Percent
from 5 to 15 years	20	31.25
none / minimal	23	35.94
up to 5 years	19	29.69
over 25 years old	2	3.13
What field do you study or work in? (Pre1 + Post1)		
Field of study	Number	Number
social sciences (e.g. pedagogy)	43	66.15
humanities (e.g. philology)	11	16.92
natural and mathematical sciences	5	7.69
another	6	9.23

Table 2
Descriptive Statistics (Pre1 + Post1)

	n	Me (min–max)		Me (min–max)	p-value
Pre 1 Which statement most accurately reflects your approach to using ICT in your own teaching?	66	103 (101–105)	Post 1	103 (101–105)	0.006
Pre 1 How would you rate your competence in the adaptation and use of digital technologies in your teaching?	66	103 (101–105)	Post 1	103 (101–104)	0.004
Pre 1 In general, how would you rate your level of skills and effectiveness in using ICT and innovative teaching methods in designing the educational process and/or at work?	66	102 (101–105)	Post 1	102 (101–105)	0.0008
Pre 1 development of multimedia presentations	65	102 (101–105)	Post 1	104 (101–105)	0.002
Pre 1 video recording	65	102 (101–105)	Post 1	103 (101–105)	0.0009
Pre 1 video publishing	65	102 (101–105)	Post 1	103 (101–105)	0.0005
Pre 1 online video / video streaming	65	102 (101–105)	Post 1	103 (101–105)	0.0005
Pre 1 digital storytelling	65	101 (101–105)	Post 1	103 (101–105)	0.0000
Pre 1 discussion forums with general questions and answers	65	102 (101–105)	Post 1	103 (101–105)	0.0015
Pre 1 gamification	65	101 (101–105)	Post 1	103 (101–105)	0.0000
Pre 1 tools to support innovative teaching and learning methods	65	102 (101–105)	Post 1	103 (101–105)	0.0000
Pre 1 online tutoring tools	65	102 (101–105)	Post 1	103 (101–105)	0.0000
Pre 1 online collaboration tools	65	102 (101–105)	Post 1	103 (101–105)	0.0006
Pre 1 e-communication tools	65	103 (101–105)	Post 1	103 (101–105)	0.1192
Pre 1 graphic development (for example infographics, mind maps/ knowledge maps)	65	102 (101–105)	Post 1	103 (101–105)	0.0000

Table 3
Codes:

(1) I'm not sure at all	101
(2) somewhat confident	102
(3) I am confident	103
(4) very confident	104
(5) I rate my competencies as „Excellent”	105

It was verified by the Wilcoxon test that there is a *significant difference* in the question „pre 1 Which statement most accurately reflects your approach to using ICT in your own teaching? & post 1”, p value = 0.006 <significance level α = 0.05.

There is a significant difference when we look at the medians. However, for the pre- and post-tests the medians *are the same*, but the lower and upper quarter for the pre-test is 102 to 103 while it varies from 102 to 104 in the post-test. According to the codes, 102 means a bit confident, 103 = I'm confident, 104 = very confident. So, over a period of time, it appears that we have a growing tendency in self-confidence (Figure 2).

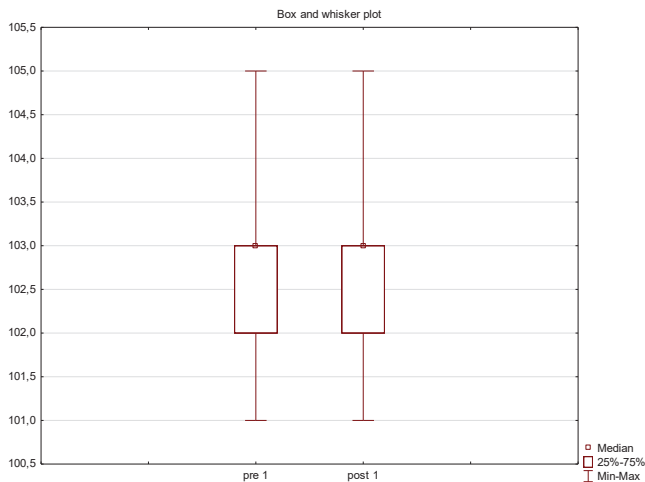


Figure 2. Comparison of the answers to the question “Which statement most accurately reflects your approach to using ICT in your own teaching?” in the pre and post-tests.

As we live and work in a digital society, including e-economy, e-finance, e-business and e-education, our teachers should be prepared for the changing learn-

ing environments as well as the students' learning needs. The world is changing together with the contents, technologies, tools, teaching and learning methods. The teachers should also learn how to be flexible in using a variety of the teaching techniques and tools to adjust them to the learning purposes. As practice shows, the students' motivation to learn depends, to a large extent, on the attractiveness and creativity of the teaching methods and tools. Realizing this condition and knowing how to implement it into the teaching practice is an important component of the teachers' professional competence. Thanks to the course, the students could learn and broaden their knowledge about modern tools for the development of various types of video, digital storytelling, infographics, and knowledge maps. (www.navoica.pl)

It was verified by the Wilcoxon test that there is a significant difference in the question „pre 1 How would you rate your competence in the adaptation and use of digital technologies in your teaching? & post 1”, p value = 0.004 <significance level alpha = 0.05.

There is a significant difference when we look at the medians. However, for the pre- and post-tests the medians *are the same*, but the lower and upper quarter for the pre-test is 102 to 103 while it varies from 102 to 104 in the post-test. According to the codes, 102 means a bit confident, 103 = I'm confident, 104 = very confident. So, over a period of time, it appears that we have a growing tendency in self-confidence (Figure 3).

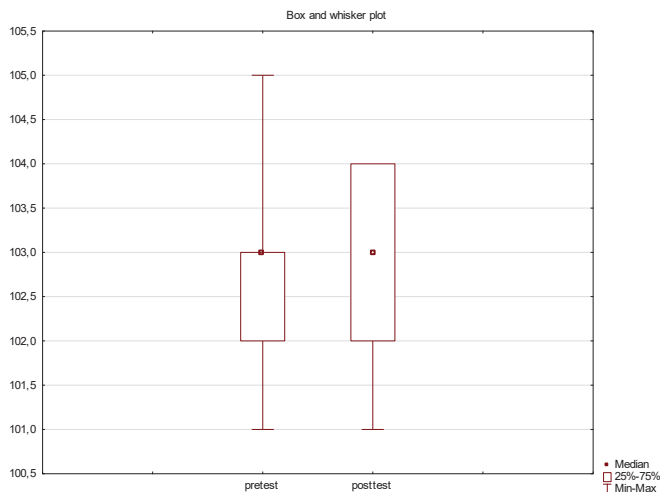


Figure 3. Comparison of the answers to the question “How would you rate your competence in the adaptation and use of digital technologies in your teaching?” in the pre and post-tests.

The participants of the MOOC could learn the principles of effective usage of gamification in education, the methods of flipped classroom, e-communication and e-collaboration, and online tutoring. The materials are diverse, varying from the simplest and accessible descriptions to scientific publications with the results of the research by scientists from different countries. (www.navoica.pl)

It was verified by the Wilcoxon test that there is a *significant difference* in the question „pre 1 In general, how would you rate your level of skills and effectiveness in using ICT and innovative teaching methods in designing the educational process and / or at work? & post 1”, p value = 0.0008 < significance level $\alpha = 0.05$. (Figure 4).

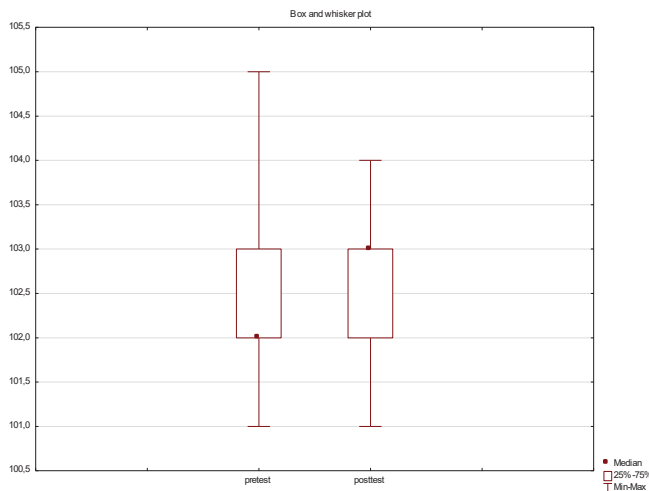


Figure 4. Comparison of the answers to the question “In general, how would you rate your level of skills and effectiveness in using ICT and innovative teaching methods in designing the educational process and/or at work?” in the pre and post-tests.

The course targeted a wide audience of users – pre-service teachers, tutors, educators, methodologists, educators, and all other categories of learners. The participants could actively participate in the discussion forums, present their experiences and examples of good practice. The tests were provided with the feedback and evaluative comments at all stages, the formative assessment was applied to objectively determine the level of the students' achievements. Thanks to the numerous videos, including instructional tutorials, the MOOCs participants could improve their knowledge and skills of effective teaching and learning, while learning itself became friendly and fun. (www.navoica.pl)

2.2. The respondents highly assessed their skills and self-effectiveness in the use of information and communication technologies, as well as innovative teaching methods in the design of the educational process and/or at work before and after attending a MOOC.

3. Knowledge of different types of ICT tools and innovative educational methods in learning and (online) learning practice (based on self-assessment) has increased before and after participating in a MOOC.

It was verified by the Wilcoxon test that there is a *significant difference* in the question „pre 1 development of multimedia presentations & post 1 development of multimedia presentations”, p value = 0.0018 <significance level α = 0.05. (Figure 5).

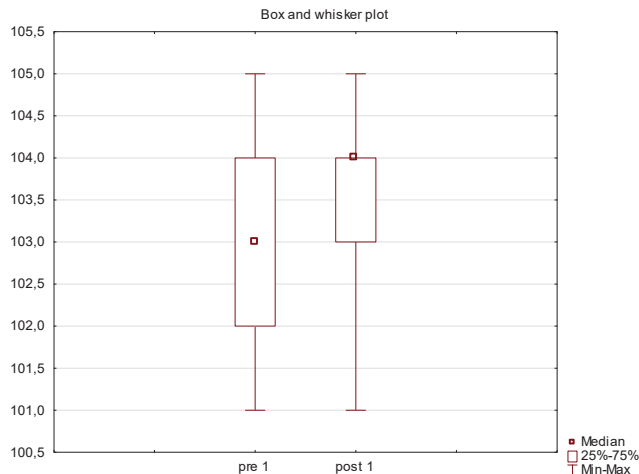


Figure 5. Comparison of the answers to the question on the development of the multimedia presentations in the pre and post-tests.

Module 2 of MOOC was devoted to the development of multimedia presentations and included Lesson 1 Theoretical, methodological, and practical aspects of making presentations and Lesson 2 Methodological and practical aspects of making presentations, ICT tools.

Among its main aims were as follows:

- Find out what a presentation is;
- Study the classifications / types of presentation;
- Learn about the stages of making presentations;
- Extend knowledge about programs and applications for making presentations;

- Learn software for making and converting presentations into a didactic video;
- Learn about services for posting presentations;
- Extend knowledge about methodological aspects of developing and using presentations;
- Find out the required competences;
- Errors students usually make when designing a multimedia presentation;
- Additional requirements for presentations and specific slides;
- ICT instruments and applications for developing presentations;
- Practical use of ICT tools: A video on PowerPoint 365;
- Practical use of ICT tools: A video on Prezi.

The content of the module was developed based on the research of the experts from different countries in the field of multimedia presentations and their didactic potential. In particular to mention is the study by Cong, Tago, & Jin (2022), where the researchers investigate cognitive load in multimedia presentations. It states that the development of the interface design can reduce extraneous processing for users and increase the effectiveness of multimedia presentations.

For the question „pre 1 video recording & post 1 video recording”, it was verified by the Wilcoxon test that there is a *significant difference*, p value = 0.0009 <significance level α = 0.05. (Figure 6).

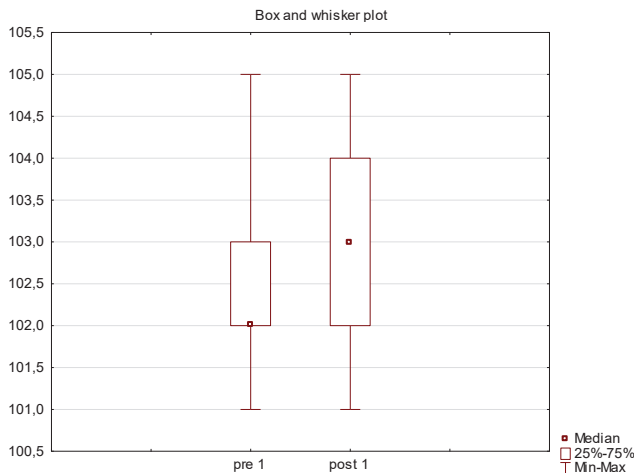


Figure 6. Comparison of the answers to the question on the video recording in the pre and post-tests.

It was verified by the Wilcoxon test that there is a *significant difference* in answers to the question „pre 1 video publishing & post 1 video publishing”, p value = 0.0005 <significance level α = 0.05. (Figure 7).

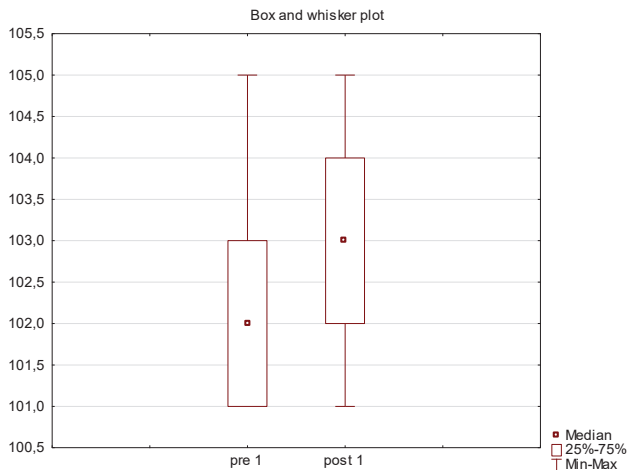


Figure 7. Comparison of the answers to the question on video publishing in the pre and post-tests.

It was verified by the Wilcoxon test that there is a *significant difference* in answers to the question „pre 1 video online / streaming video & post 1 video online / streaming video”, p value = 0.0005 < significance level $\alpha = 0.05$. (Figure 8).

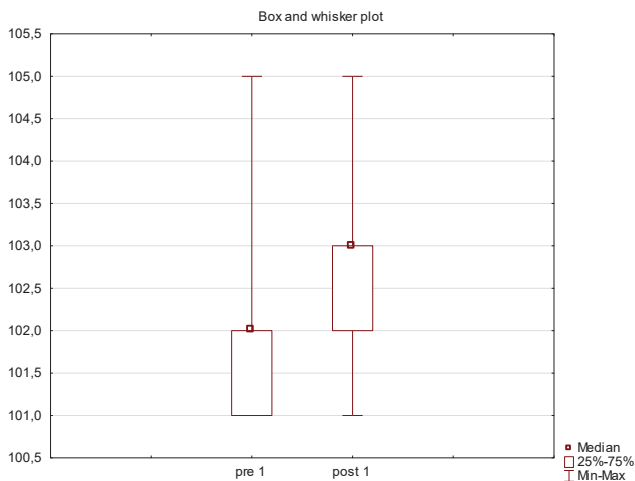


Figure 8. Comparison of the answers to the question on online video / video streaming in the pre and post-tests.

In Module 3, titled “Theoretical, methodological and practical aspects of developing a didactic video”, the students could find out what a didactic video is,

learn about its classification and types. They also studied the rules of developing a didactic video and necessary tools. Another study point covered the methodological aspects of developing and using a didactic video as well as the rules and examples of its practical use in education, explaining the required competences. The content of the module included the following topics:

- Theoretical, methodological and practical aspects of developing a didactic video;
- What is the video? Classification / types of videos;
- Stages of developing a video;
- Programs for developing a video;
- Programs for developing and converting a presentation into a didactic video;
- Services for posting videos;
- Methodological aspects of developing and using presentations;
- Required competences;
- Theoretical and methodological aspects and basic guidelines for the use of Screencast in the teaching process;
- Theoretical and methodological aspects of a Screencast in PowerPoint;
- Some recommendations on the use of didactic videos in e-learning courses;
- Basic rules for developing didactic videos in the computer form for the digital storytelling;
- Important suggestions for didactic video authors.
- Services for posting videos (www.navoica.pl)

We agree with the experts and their research stating that while “the video production (VPR) group of students use multimodal semiotic resources to design a video and establish their relationships with viewers, they simultaneously adapt their discursual identities.” (Yu, & Zadorozhnyy, 2022). From this point of view, the competences and skills to design a video which would be effective enough to translate the teachers' ideas and bring them to the students' understanding are of exceptional importance in our time of extensive visualization.

The evaluated MOOC also included the content on the Dynamic Adaptive Streaming over HTTP (MPEG-DASH), which ensures online videos display of good quality without interruption and can be useful for the specific field of Massive Open Online Courses (MOOCs) where learners can profit from an exceptional visual experience that improves their commitment level and eases the course assimilation (Sebai, D. & Mani, E. (2020).

Other authors emphasize that students get “motivated by the dynamic streaming feature that allows a video stream to consist of multiple chunks having different qualities” (Kim, & Choi, 2022).

The answers to the question „pre 1 digital storytelling & post 1 digital storytelling” were verified by the Wilcoxon test which showed a *significant difference*

in the answers before and after taking the MOOC, p value = 0.0000 < significance level $\alpha = 0.05$. (Figure 9).

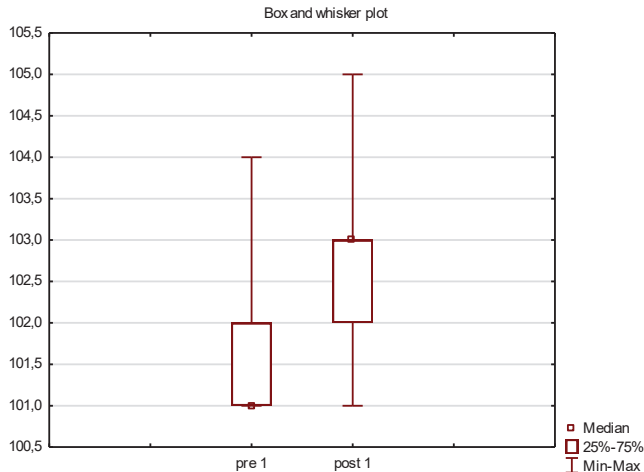


Figure 9. Comparison of the answers to the question on digital storytelling in the pre and post-tests.

In Module 4, “Theoretical, methodological and practical aspects of developing a digital story (digital storytelling)”, the participants learned what a digital story is and what it is for. They became familiar with different types of tools and principles of development of a digital story. The information presented was illustrated with selected examples of completed digital story projects. The students module also learned about the competences needed to create a digital story. (Smyrnova-Trybulska, et al., 2021)

Thus, the students learned:

- What is a digital story?
- Digital story classification / types.
- The changing face of digital stories.
- A few suggestions for digital storytelling and game designers.
- Methodical aspects of developing and using a digital story.
- Stages of developing a digital story (Create a digital story). The process of creating a story.
- Competences to be developed and required competences.

They also gained the knowledge on the programs and tools to be used for creating a digital story:

- Selected programs for the development of a digital story.
- Additional useful ICT tools for developing digital stories.

- Websites to post your digital story.
- Storytelling e-tools. (www.navoica.pl)

As it was stressed by Kameas, Quarta, & Maratou, (2018), “digital storytelling is a powerful and effective learning tool in stimulating creativity, digital literacy and critical thinking.” The researchers emphasize that the act of publishing one’s story, trying to influence peers and/or not to remain silent about social issues is an important factor in nurturing a learner’s personality as a critical thinker and an active citizen of their community. (Kameas, et al., 2018). In this sense, we agree with the experts that with the development of the digital storytelling skills, learners can transform into empowered actors who choose to put their stories out in order to raise awareness and help others (Kameas, Quarta, & Maratou, 2018).

A *significant difference* was verified by the Wilcoxon test between the answers to the question of „pre 1 discussion forums with general questions and answers & post 1 discussion forums with general questions and answers”, p value = 0.0015 <significance level alpha = 0.05. (Figure 10).

The MOOC contained several forums about the program in general and specific forums on the subject of each module. On the platforms of the forums, the course participants could discuss different learning and content issues, present their experience in the field of the selected contemporary ICT tools for didactic and innovative methods of creative education. These activities and experience were useful for developing students’ competences on participating in the discussion forums with general questions and answers. Their positive impact was proved by the significant difference between the answers in the pre and post-tests.

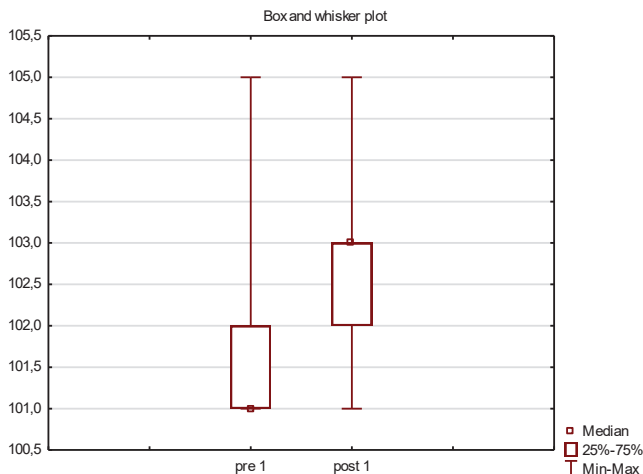


Figure 10. Comparison of the answers to the question on gamification in the pre and post-tests.

A *significant difference* was verified by the Wilcoxon test in the answers to the question „pre 1 gamification & post 1 gamification”, p value = 0.0000 <significance level alpha = 0.05. (Figure 10).

In Module 5 „**Theoretical, methodological and practical aspects of gamification**”, the participants found out what gamification is and what it is for. They learned about its types and stages of its development. Among the main subject topics were:

- What is gamification?
- Theoretical and methodological aspects of developing and using games in education (gamification);
- Structure, concepts of games;
- Stages of developing games;
- Programs for uploading games;
- Websites dedicated to the discussed subject;
- Classification / types of games;
- Required competences.

The students learned that gamification is the application of game-design elements and game principles applied in non-game contexts (Werbach, 2014). The main reason for defining gamification as a process is to provide a scale for gamification and not an absolute category. Gamification commonly employs game design elements to improve user's engagement, for example in the educational process, to increase organizational productivity, data flow, learning, employee recruitment and evaluation, physical exercise, traffic violations, etc. The long history and varied ways of incorporating gameful interactions to educational contexts has also lead to varying terminology for the approach, e.g. serious games, edugames or games for education, game-based learning, and lately, gamification (Landers, 2014; Seaborn & Fels, 2015; Deterding, 2014). Researchers believe that all of these varied approaches are manifestations of gamification in education and learning (Majuri, Koivisto, & Hamari, 2018).

It was verified by the Wilcoxon test that there is a *significant difference* in the question „pre 1 tools to support innovative teaching methods of learning & post 1 tools to support innovative teaching methods of learning”, p value = 0.0000 <significance level alpha = 0.05. (Figure 11).

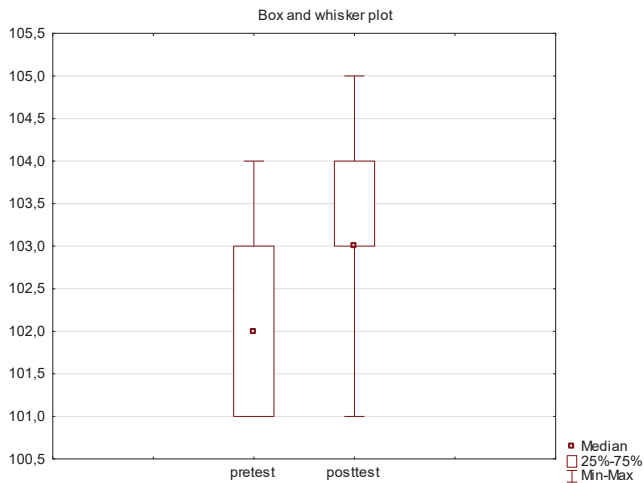


Figure 11. Comparison of the answers to the question on tools to support innovative teaching methods of learning in the pre and post-tests.

At various educational levels, in particular in the development of the pedagogy students' IT competence at university, instructors should use innovative, active teaching-learning methods, which include first of all:

- Problem-based learning;
- Project-based learning;
- Inquiry based learning;
- Flipped classroom;
- Adaptive learning,

which were described and analyzed in Module 6. “Innovative teaching and learning methods”.

The participants of the MOOC could also learn about the basic psychological and pedagogical aspects of the ICT and e-learning supported educational process, among others, the theories of constructivism and connectivism, scientific aspects of the implementation of the zone of proximal development, psychology of limitation and more.

The Module featured various theoretical, methodological and practical aspects of the use of these methods, interesting examples, suggestions, propositions of the ICT and e-learning supported educational process design.

A *significant difference* was verified by the Wilcoxon test in the question „pre 1 online tutoring tools & post 1 online tutoring tools”, p value = 0.0000 <significance level $\alpha = 0.05$. (Figure 12).

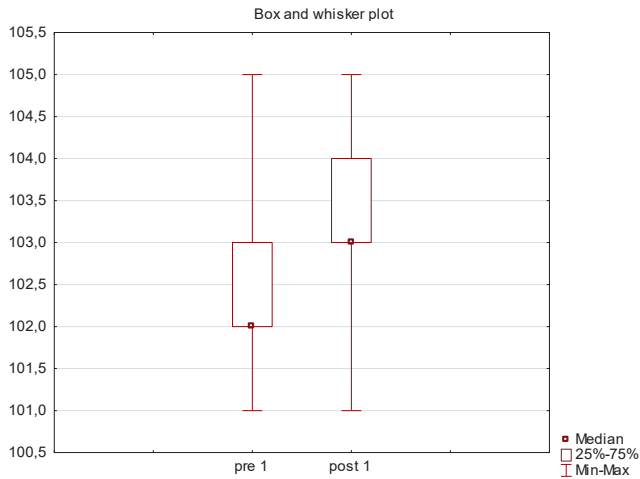


Figure 12. Comparison of the answers to the question on online tutoring tools & post 1 online tutoring tools in the pre and post-tests.

The students' positive evaluation of their progress within the module on online tutoring can refer to the module's systematic layout of the learning material which targeted the specifics of online tutoring as a teaching/learning activity.

As far as the students had already got the knowledge of different kinds of ICT tools and innovative teaching methods before joining the module on online tutoring, the aim of the module was to streamline the obtained knowledge and enrich it with the one, concerning specifics of online tutoring.

Together with that, it was important to highlight the peculiarities of assessment as an important part of the educational process either in a formal or informal context as a crucial component of monitoring the learning process and the knowledge formation.

Another crucial moment of the content was stressing the idea that communication online and face-to-face differs in its features, therefore, online communication with learning purposes should be considerably re-evaluated in terms of sharing emotions, personalisation and interaction to enhance students' personal involvement into the learning process.

The last but not the least moment to mention about the content of the module is the guidelines for launching an online learning system which can be helpful for the institutions which are planning or already running online courses, or individuals who are going to start their own career in developing and delivering online programs. Enhancing the module with this part of the material was believed to be helpful for pre-service and in-service teachers to broaden their minds on the

potential of their profession and skills, turning them into the area of online education and tutoring.

The videos of the modules were designed to facilitate students' self-assessment in a more creative way, using graphics and music to make the tests and inputs more alive and appealing to the students' understanding.

It was verified by the Wilcoxon test that there is a significant difference in the question “pre 1 online collaboration tools & post 1 online collaboration tools”, p value = 0.0006 <significance level α = 0.05. (Figure 13).

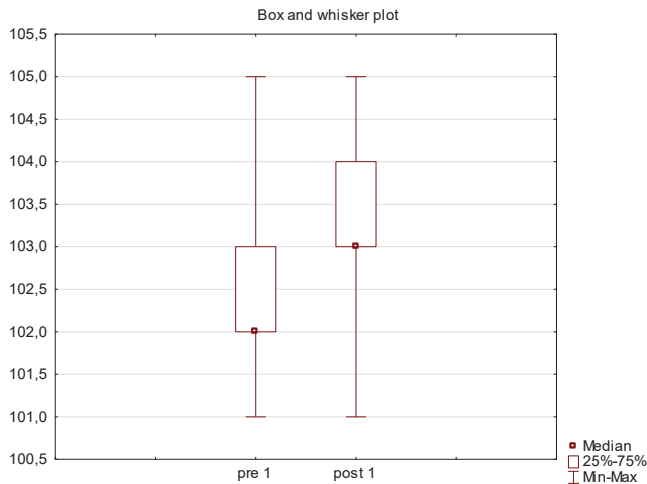


Figure 13. Comparison of the answers to the question on online collaboration tools in the pre and post-tests.

Module 7 “ICT tools for e-communication and e-collaboration” contained three lessons.

In Lesson 1, “Skills and Collaboration in the 21st Century and Criteria for Successful Collaboration” the participants learned about the issue of cooperation skills in the 21st century. They also acquired the competences needed and found out the criteria for effective cooperation.

Lesson 2 “Methodological and practical aspects of using ICT tools for e-collaboration and e-communication (basic)” included the content on ICT tools for collaborative learning blended learning, classification models of ICT tools for collaboration, requirements for collaboration tools.

Within Lesson 3 “Examples of tasks related to organizing student cooperation (basic)” the students became acquainted with the examples of tasks related to organizing students' cooperation (purposes, participants, conditions and types of

cooperation) and examples of tasks related to organizing students' collaboration (digital tools).

The module included a lot of models, schemes, tools description and examples to illustrate the content.

Simultaneously it was verified by the Wilcoxon test that there is *no significant* difference in the answers to the question „pre 1 e-communication tools & post 1 e-communication tools”, p value = 0.1192 > significance level alpha = 0.05.

The probable reason for this result is that before joining the module, the students had already got extended knowledge and experience in using e-communication tools, e.g. messengers, social media etc., which were also well-known and widely spread among various categories of users for the purposes of private and business communication.

It was verified by the Wilcoxon test that there is a *significant difference* in the answers to the question „pre 1 graphic development (e.g. infographics, mind maps/knowledge maps) & post 1 graphic development (e.g. infographics. mind maps/knowledge maps)”, p value = 0.0000 <significance level alpha = 0.05. (Figure 14).

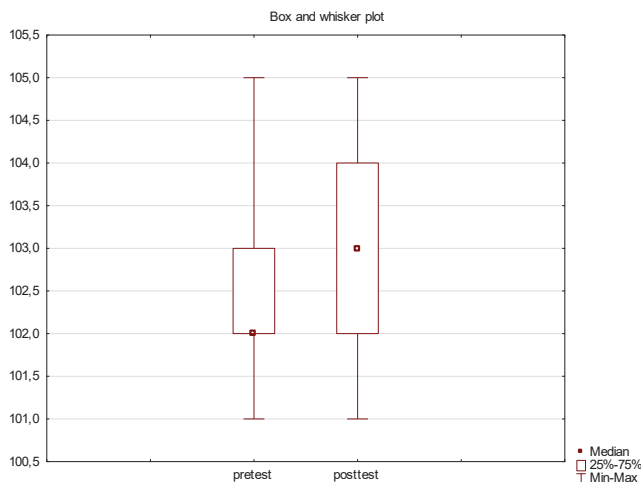


Figure 14. Comparison of the answers to the question on graphic development (e.g. infographics, mind maps / knowledge maps) in the pre and post-tests.

The Module “Presentation of graphic materials in the form of infographics and mind maps” included two lessons: 1) Theoretical, methodological and practical aspects of creating infographics in education and business; 2) Theoretical, methodological and practical aspects of creating mind maps.

In this module, the participants could learn what infographics are, their classifications / types, rules of creating infographics and relevant software, methodological aspects of creating and using infographics, rules and examples of their practical use in teaching and required competences.

They also learned what mind maps are, their types, how to create mind maps and software needed for these purposes, methodological aspects of using mind maps in teaching and learning, rules and examples of using mind maps for different educational purposes.

The results presented in this article confirmed that the MOOC "Contemporary ICT Tools and Innovative Methods of Creative Education" was elaborated according to the internationally acceptable criteria and successfully achieved its main aim to improve and enhance the digital competences and their use in education of pre-service and in-service teachers.

Conclusions

The data from the Pre-test and Post-test confirmed the participants' positive self-evaluation in developing their digital competences, which proves the research hypothesis of this study (H1, H2, H3).

The data received from the students, who attended the course, confirmed the hypothesis as follows:

1. Taking the MOOCs on Digital Competences in Education helped the students to enhance their competences in adapting and using digital technologies in their teaching, and the difference in the level of their competences before and after the course is significant.
2. The students' level of skills and effectiveness of using ICT and innovative teaching methods in designing the educational process and / or at work increased after participation in the MOOC.
3. Based on the students' self-assessment, the level of their knowledge of different ICT tools and innovative educational methods in learning and online learning practice has risen after taking the course.

In addition to the knowledge and skills obtained, the students became much more confident in using ICT technologies in their teaching and learning, which can ensure their better professional performance and openness for other educational innovations.

Taking into account findings of the recent studies on MOOCs and their quality, requirements of formal education and quality standards for online learning

made it possible to develop an effective, good-quality course, which was positively evaluated by the students.

Among the main criteria and requirements which were followed to organise the course and shape its structure was the provision of detailed description of the course, a label and a developed trailer, which included the course title and subtitle clarifying in one sentence the content of the course, information on the duration of the entire course, number of weekly modules, number of hours the students were supposed to work throughout the course and during the week, prerequisites for the required knowledge and / or skills of the course participants (no prerequisites to join the course), difficulty level, course completion conditions (short information), certification conditions (if the course ends with a certificate), information about the author / authors. It also stated the course type (open / with a limited number of participants), assumed learning outcomes, goals and outcomes of the courses, a detailed description of the assessment strategy (summative assessment and formative assessment that is consistent with the objectives, learning outcomes and course assignments), specific objectives of the modules that were consistent with the learning outcomes throughout the entire course, the modular hierarchical structure of the MOOCs.

A large amount of illustrative materials (diagrams, drawings, videos) was developed specifically for this MOOC. Special support was provided to the participants with limited abilities (visual and hearing impairment). The textual materials were accompanied with audio tapes and a variety of graphics, audio and video to make the course content accessible for the learners with special needs.

The next stage of the activities and research in this area will consist in further analysis of the students' opinions, taking into account their comments, updating and improving the course as well as analysis of the contemporary trends in improvement of MOOCs and their implementation.

Acknowledgements

This research was funded by the Statutory Research Fund of the Ministry of Education and Science of Poland, topic of research "Evolution of E-Learning in a Modern University in the Age of Challenges and a Changing World" MPK 502033000 ZFIN00001020 and "MOOC for Educational Science": POWER 03.01.00-00-W027 / 18.00 Financed by Ministry of Science and Higher Education, Poland; NCBR. Our special thanks go to Anna Sowińska, a PhD, for her support in the statistical analysis of the research results.

References

- Aldahmani, S., Ali Al-shami, S., Adil, H., & Sidek, S., (2020) A Review Paper on MOOCs Development Stages, Types, and Opportunities and Challenges. *Systematic Reviews in Pharmacy*, 2020; 11(12): 172–179, <https://doi.org/10.31838/srp.2020.12.28>
- Cabero-Almenara J, Gutiérrez-Castillo J-J, Palacios-Rodríguez A, & Barroso-Osuna J. (2020) Development of the Teacher Digital Competence Validation of DigCompEdu Check-In Questionnaire in the University Context of Andalusia (Spain). *Sustainability*. 2020; 12(15):6094. <https://doi.org/10.3390/su12156094>
- Cabero-Almenara, J., Romero-Tena, R., & Palacios-Rodríguez, A. (2020). Evaluation of Teacher Digital Competence Frameworks Through Expert Judgement: the Use of the Expert Competence Coefficient. *Journal of New Approaches in Educational Research*, 9(2), 275–293, <https://doi.org/10.7821/naer.2020.7.578>
- Condruz-Bacescu, M. (2018) Free Online Education - The Future of a Better World? In Roceanu I., Topor, S., Holotescu, C., Radu, C., Nitu, F., Grosseck, G., Radoi, M. (Eds.) Elearning Challenges and New Horizons, (pp. 303–310) <https://doi.org/10.12753/2066-026X-18-257>
- Cong, R., Tago, K. & Jin, Q. (2022) Measurement and verification of cognitive load in multimedia presentation using an eye tracker. *Multimedia Tools and Applications* 6(7), 1–15, <https://doi.org/10.1007/s11042-022-13294-0>
- Cross, J. S., Keerativoranan, N., Carlon, M. K. J., Tan, Y. H. Rakhimberdina, Z. & Mori, H., (2019) Improving MOOC quality using learning analytics and tools, *2019 IEEE Learning With MOOCS (LWMOOCS)*, 2019, (pp. 174-179), <http://doi.org/10.1109/LWMOOCS47620.2019.8939617>.
- Deng, R., Benckendorff, P., & Gannaway, D. (2019). Progress and new directions for teaching and learning in MOOCs. *Computers & Education* 129, 48–60, <https://doi.org/10.1016/j.compedu.2018.10.019>
- Deterding, S., (2011). Situated motivational affordances of game elements: A conceptual model, in: *Presented at Gamification: Using Game Design Elements in Non-Gaming Contexts*, a workshop at CHI 2011. <http://gamification-research.org/wp-content/uploads/2011/04/09-Deterding.pdf> (Accessed 28 October 2015).
- Gordillo A., López-Pernas S., & Barra E. (2019). Effectiveness of MOOCs for teachers in safe ICT use training. *Comunicar*. Open Access. 27(61), 98-107, 2019. ISSN 11343478, <https://doi.org/10.3916/C61-2019-09>
- Grodecka, K., Mokwa-Tarnowska, I., & Peszko, P. (2019). Praca zbiorowa NAVOICA Polska platforma edukacyjna oferująca kursy typu MOOC Wytyczne dla twórców kursów. A. Kaczmarek-Kacprzak, K. Kurowska-Wilczyńska, B. Muczyński (red.) [Warszawa 2019 NAVOICA Polish educational platform offering MOOCs Guidelines for course developers.] Wydawnictwo Fundacja Młodej Nauki, Warszawa 2020.
- Kameas, A., Quarta, B. & Maratou, V. (2018) Educating Global Citizens with the Help of a MOOC, *EDULEARN18 Proceedings*, pp. 10933–10942.
- Kim, D. & Choi, M. (2022) Impacts of Device Caching of Content Fractions on Expected Content Quality, in *IEEE Wireless Communications Letters*, 11(5), (pp. 1022–1026), May 2022, <http://doi.org/10.1109/LWC.2022.3153125>.
- Koukis N., & Jimoyiannis A., (2018) MOOCs and teacher professional development: A case study on teachers' views and perceptions MCCSIS 2018 – Multi Conference on Computer Science and Information Systems In Proceedings of the International Conferences on e-Learning

- 2018 Volume 2018-July, (pp. 19–26) International Conference e-Learning 2018, part of the Multi Conference on Computer Science and Information Systems 2018, MCCSIS 2018 Madrid 17 July 2018 through 19 July 2018 Code 912893820 ISBN 978-989853378-4
- Landers, R. N. (2014). Developing a theory of gamified learning: Linking serious games and gamification of learning. *Simulation & Gaming*, 45(6), 752–768.
- Majuri, J., Koivisto, J., & Hamari, J. (2018) Gamification of education and learning: A review of empirical literature In Proceedings of the 2nd International GamiFIN Conference (GamiFIN 2018) (pp. 11–19). Eds. by Koivisto J. & Hamari J. CEUR Workshop Proceedings. 2186. CEUR-WS. ISSN: 1613–0073. <http://ceur-ws.org/Vol-2186/paper2.pdf>. https://trepo.tuni.fi/bitstream/handle/10024/104598/gamification_of_education_2018.pdf
- Molanes-Lopez, E.M., Rodriguez-Ascaso, A., Leton E., & Perez-Martin, J. (2021) Assessment of Video Accessibility by Students of a MOOC on Digital Materials for All IEEE Access Open Access. 9, (pp. 72357–72367) Article number 9427559, <https://doi.org/10.1109/ACCESS.2021.3079199>, ISSN 21693536
- Morze, N. & Smyrnova-Trybulska, E. (2021) Web-Based Community-Supported Online Education During the COVID-19 Pandemic. *International Journal of Web Based Communities (IJWBC)* 17(1), 9–34 <http://doi.org/10.1504/IJWBC.2021.10032201>
- Patru, M., & Balaji, V. (2016) Making sense of MOOCs: a guide for policy makers in developing countries (2016) Commonwealth of Learning, UNESCO. Assistant Director-General for Education, 2010-2018 (Qian Tang). ISBN: 978-92-3-100157-4 2016
- Polish MOOCs platform Navoica (www.navoica.pl).
- Razzali, K. K. S., Shahbodin, F., & Noor, H. (2016). Measuring validity and reliability of perception of online collaborative learning questionnaire using Rasch model. *International Journal on Advanced Science Engineering and Information Technology*, December, 966-974. <http://dx.doi.org/10.18517/ijaseit.6.6.1343>
- Seaborn, K., & Fels, D. I. (2014). Gamification in theory and action: A survey. *International Journal of Human-Computer Studies*, 74, 14–31.
- Sebai, D. & Mani, E. (2020) MPEG-DASH users quality of experience enhancement for MOOC videos, *2020 IEEE International Symposium on Multimedia (ISM)*, 2020, pp. 166-167, <https://doi.org/10.1109/ISM.2020.00036>.
- Segovia García, N. (2021) Quality criteria of a Massive Open Online Course (MOOC) based on students' assessment [Critères de qualité d'un MOOC basés sur l'évaluation des étudiants][Criterios De Calidad De Un MOOC Basado En La Valoración De Los Estudiantes]. *Bordon. Revista de Pedagogia* 73(4), 145–160 <https://doi.org/10.13042/Bordon.2021.87938>, ISSN 02105934
- Sekret, I. (2021). Students' Evaluation of Teaching: International Practices from the Students' Perspectives. *International Journal of Pedagogical Advances in Technology-Mediated Education*, 2 (1), 26–38. ISSN 2651-4427. <http://patme-journal.iatels.com/index.php/patme/article/view/students-evaluation-of-teaching>
- Sekret, I., & Jansen, D. (2019). Multilevel Study of the Higher Education Challenges Caused by the Migration Crisis in Turkey. In: Smyrnova-Trybulska, E., Kommers, P., Morze, N., Malach, J. (eds) *Universities in the Networked Society. Critical Studies of Education*, vol. 10. Springer, Cham. https://doi.org/10.1007/978-3-030-05026-9_9
- Smyrnova-Trybulska E., Morze, N., Sekret, I. McKay, E., & Asquith, K., (2022) Development of the digital competences of pre-service and in-service teachers using the MOOC: Rasch Measurement Model in Assessing. (In Press)
- Smyrnova-Trybulska E., Sekret, I., & Morze, N. (2021) Preliminary Analysis of the Development And Implementation of the MOOC Project: A Case Study, In Smyrnova-Trybulska E. (ed.)

- E-learning in the Time of COVID-19. "E-learning" Series*. Vol. 13 (2021) Katowice-Cieszyn: STUDIO NOA for University of Silesia. 2021. (pp. 137–150). ISSN 2451-3644 (print edition) ISSN 2451-3652 (digital edition) ISBN: 978-83-66055-25-4 <https://doi.org/10.34916/el.2021.13.12>
- Smyrnova-Trybulska, E., McKay, E., Morze, N., Yakovleva, O., Issa, T. & Issa, Th. (2019). Develop and Implement MOOCs Unit: a Pedagogical Instruction for Academics, Case Study In: E. Smyrnova-Trybulska, P. Kommers, N. Morze, J. Malach (Eds.). *Universities in the Networked Society. Cultural Diversity and Digital Competences in Learning Communities*. Springer. *Critical Studies of Education* 10 (pp. 103–132), ISBN 978-3-030-05025-2, https://doi.org/10.1007/978-3-030-05026-9_7.
- Smyrnova-Trybulska, E., Ogrodzka-Mazur, E., Szafrńska-Gajdzica, A., Morze, N., Makhashvili, R., Noskova, T., Pavlova, T., Yakovleva, O., Issa, T. & Issa, Th. (2016). MOOCs – Theoretical and Practical Aspects: Comparison Of Selected Research Results: Poland, Russia, Ukraine, and Australia. In: P. Kommers, T., Issa, Th. Issa, E., McKay, & P., Isaías. *Proceedings Of The International Conferences On Internet Technologies & Society 2016 (ITS 2016) Educational Technologies 2016 (IcEduTech 2016) And Sustainability, Technology And Education 2016 (STE 2016) Melbourne, Australia 6–8 December, IADIS 2016* (pp. 107–114). ISBN: 978-989-8533-58-6.
- Stracke, C.M., & Trisolini, G. A (2021) Systematic Literature Review on the Quality of MOOCs. *Sustainability*, 13, 5817. <https://doi.org/10.3390/su13115817>
- Su, P.-Y., Guo, J.-H., & Shao, Q.-G. (2021) Construction of the Quality Evaluation Index System of MOOC Platforms Based on the User Perspective. *Sustainability*, 13, 11163. <https://doi.org/10.3390/su132011163>
- Svoboda, P., & Mynaříková, L. (2021). MOOC Courses as a Tool for the Development of Digital Competencies of Teachers. In: Nazir, S., Ahram, T.Z., Karwowski, W. (eds) *Advances in Human Factors in Training, Education, and Learning Sciences*. AHFE 2021. *Lecture Notes in Networks and Systems*, vol 269. Springer, Cham. https://doi.org/10.1007/978-3-030-80000-0_29
- Werbach, K., & Hunter, D. (2015) *The Gamification Toolkit: Dynamics, Mechanics, and Components for the Win*. Wharton School Press <https://wsp.wharton.upenn.edu/book/gamification-toolkit/>
- Yu, B., & Zadorozhnyy, A. (2022). Developing students' linguistic and digital literacy skills through the use of multimedia presentations. *ReCALL*, 34(1), 95-109. doi:10.1017/S0958344021000136

Eugenia Smyrnova-Trybulska, Iryna Sekret, Nataliia Morze, Elspeth McKay

**Ocena jakości MOOC i jego skuteczności w szkoleniu nauczycieli
w zakresie kompetencji cyfrowych i ich wykorzystania w edukacji:
Studium przypadku**

Streszczenie

W niniejszym opracowaniu przedstawiono wyniki badań uzyskane w wyniku oceny kompetencji cyfrowych przyszłych i czynnych nauczycieli po ukończeniu kursu MOOC „Współczesne narzędzia ICT i innowacyjne metody kreatywnej edukacji”. Artykuł zawiera krótki opis MOOC, wymagania do zaliczenia kursu oraz analizę efektów uczenia się poprzez samooc-

nę i informację zwrotną studentów. MOOC został opracowany w języku polskim i angielskim w ramach projektu „MOOCs for Sciences of Education” i udostępniany na polskiej platformie MOOCs Navoica (www.navoica.pl) w ramach konkursu, zainicjowanego przez Ministerstwo Edukacji i Nauki RP oraz Narodowe Centrum Badań i Rozwoju (NCBR – Narodowe Centrum Badań i Rozwoju) pt. „Kierunek do MOOC”. Mając na uwadze, że masowe otwarte kursy online (MOOC) stały się głównym nurtem dla uniwersytetów, reformatorów edukacji i firm rozpoczynających działalność, szczególnie w czasach COVID-19, uważa się, że badanie przyczyni się do rozwoju pedagogiki MOOC oraz pozwoli zająć się kwestią skuteczności MOOC w zakresie efektów uczenia się i satysfakcji uczniów. Eksperymentalny MOOC „Współczesne narzędzia ICT i innowacyjne metody kreatywnej edukacji”, który miał na celu zwiększenie kompetencji cyfrowych nauczycieli, składał się z 8 modułów i w jego pierwszej edycji w latach 2020–2021 wzięło udział ponad 90 uczniów. Konkluzje MOOC w ogólne zalecenia dotyczące zwiększenia skuteczności MOOC w zakresie edukacji formalnej i efektów uczenia się zostały ocenione na podstawie danych z badań i odpowiednio przedstawione. Wybrane analizy statystyczne i porównania danych wykonano testem Wilcoxon na poziomie istotności $\alpha = 0.05$. Normalność rozkładów badanych zmiennych sprawdzono za pomocą testu Shapiro Wilka.

S ł o w a k l u c z o w e: MOOC; edukacja, kompetencje cyfrowe; nauczyciele; narzędzia ICT w edukacji

Евгения Смирнова-Трибульская, Ирина Секрет, Наталия Морзе, Элспет МакКей

**Оценка качества MOOC и его эффективности в формировании
у учителей цифровых компетентностей и их использования в образовании:
тематическое исследование**

А н н о т а ц и я

В работе представлены результаты исследования, полученные в результате оценки цифровых компетенций педагогов до и после прохождения ими MOOC «Современные средства ИКТ и инновационные методы креативного образования». В статье представлено краткое описание MOOC, требования к прохождению курса и анализ результатов обучения посредством самооценки и обратной связи студентов. MOOC был разработан на польском и английском языках в рамках проекта «MOOC для наук об образовании» и размещен на польской платформе MOOC Navoica (www.navoica.pl), разработан в рамках конкурса, инициированного Министерством образования и науки Польши, и Национальным центром исследований и развития (NCBR – Narodowe Centrum Badań i Rozwoju) по теме «Направление на MOOC». Принимая во внимание тот факт, что массовые открытые онлайн-курсы (MOOC) стали основным направлением для университетов, реформаторов образования и начинающих компаний, особенно во время COVID-19, можно предположить, что исследование способствует развитию педагогики MOOC, а также способствует решению вопроса об эффективности MOOC для результатов обучения и удовлетворенности студентов. Экспериментальный MOOC «Современные средства ИКТ и инновационные методы креативного образования», направленный на повышение цифровых компетенций учителей, состоял из

8 модулей и в 1-м выпуске которого в 2020–2021 годах приняли участие более 90 студентов. Выводы основных MOOC и общие рекомендации по повышению эффективности MOOC для формального образования и результатов обучения были оценены на основе данных исследования и представлены соответствующим образом. Выбранные статистические анализы и сравнения данных были выполнены с использованием критерия Уилкоксона при уровне значимости $\alpha = 0.05$. Нормальность распределений исследуемых переменных проверяли с помощью теста Шапиро-Уилка.

Ключевые слова: MOOC; образование, цифровые компетенции; учителя; ИКТ-инструменты в образовании

Eugenia Smyrnova-Trybulska, Iryna Sekret, Natalia Morze, Elspeth McKay

Evaluación de la calidad y eficacia de los MOOC en la formación del profesorado en competencia digital y su uso en la educación: un estudio de caso

Resumen

Este estudio presenta los resultados de la investigación obtenidos tras la evaluación de las competencias digitales de los docentes en formación y en servicio tras la realización del MOOC “Herramientas TIC Contemporáneas y Métodos Innovadores de Educación Creativa”. El artículo proporciona una breve descripción del MOOC, los requisitos para aprobar el curso y el análisis de los resultados del aprendizaje a través de la autoevaluación y la retroalimentación de los estudiantes. El MOOC se desarrolló en polaco e inglés dentro del proyecto “MOOCs for Sciences of Education” y se alojó en la plataforma polaca de MOOCs Navoica (www.navoica.pl) en el marco de la competencia, iniciada por el Ministerio de Educación y Ciencia de Polonia, y el Centro Nacional de Investigación y Desarrollo (NCBR – Narodowe Centrum Badań i Rozwoju) sobre “Dirección hacia el MOOC”. Teniendo en cuenta que los cursos masivos abiertos en línea (MOOC) se han convertido en una corriente principal para universidades, reformadores de la educación y empresas emergentes, especialmente en tiempos de la COVID-19, se cree que el estudio contribuye al desarrollo de la pedagogía de los MOOC., y abordar la cuestión de la eficacia de los MOOC para los resultados de aprendizaje y la satisfacción de los estudiantes. El MOOC experimental “Herramientas TIC Contemporáneas y Métodos Innovadores de Educación Creativa”, que tenía como objetivo mejorar las competencias digitales de los docentes, contenía 8 módulos y contó con la asistencia de más de 90 estudiantes hasta su primera edición en 2020–2021. Las conclusiones del MOOC en el enfoque y las recomendaciones generales sobre la mejora de la eficacia de los MOOC para la educación formal y los resultados del aprendizaje se evaluaron en función de los datos de investigación y se proporcionaron en consecuencia. Los análisis estadísticos seleccionados y las comparaciones de datos se realizaron mediante la prueba de Wilcoxon al nivel de significación $\alpha = 0.05$. La normalidad de las distribuciones de las variables estudiadas se comprobó mediante la prueba de Shapiro Wilk.

Palabras clave: MOOC; educación, competencias digitales; maestros; Herramientas TIC en la educación

