



## Innovations in Online Education in Post-COVID-19

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### Keywords:

Skill;  
Competence;  
Innovation;  
Online education



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**Abstract:** *The COVID 19 pandemic found the management of universities and many university teachers well prepared, but others only partially acquainted with the use of electronic tools in teaching. Many universities in Slovakia have been working for a long time (ten to fifteen years) with technical support for education and supplement the full-time form of teaching with thematic e-learning packages, for instance in the moodle system. They can work with them in full-time and distance education. However, the COVID-19 pandemic redirected teaching from full-time teaching exclusively to a mediated technically supported approach to online education. The paper aims to define and analyse online education in terms of digital skills and competences requirements. Particular attention is paid to the key digital skills and competences of higher education teachers working in a new educational reality framed by the effects of digital transformation, which requires higher education educators to create and apply innovations in online education at universities.*

### 1. INTRODUCTION

The pandemic of the new coronavirus COVID 19 has brought to the fore the need to respond in a new way to an unexpected and new situation that has forced new demands on learning and education. The new trends that the pandemic has evoked in the development of society can be described by the single term digital transformation. It represents a new trajectory of economic and social development, with digitalisation affecting almost all areas of life and work, including education and job training.

Especially in the field of higher education, the digital transformation raises new requirements, especially in terms of preparing for new skills that allow teachers to use digital technologies in online education and students to participate in the educational process in the online environment. The onset of digital transformation has been rather gradual in the recent past, but the pandemic of the new coronavirus COVID 19 has significantly accelerated this digital transformation. It is, therefore, necessary to study the new challenges and opportunities that digital transformation brings to higher education. Also due to the fact that after the eventual end of the COVID 19 pandemic, it is not possible to expect a return to the so-called normal, but it is necessary to prepare for the so-called “new normal”, which means the new educational reality in which digital technologies will play an increasingly important role. The world has changed significantly under the influence of the exogenous factor of the COVID 19 pandemic. The perspective of higher education requires that educators prepare for the new approach, which is likely to be a hybrid model of education.

The forms and methods of education at universities have inevitably adapted to the requirements of the times. In higher education, the pandemic of the new coronavirus required respecting and adapting to a new type of educational reality in virtual conditions. It required students and university teachers to improve their work with digital technologies and develop their digital skills and digital competences, and formulated an urgent call for university leaders to ensure relevant learning conditions in a virtual environment.

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## 2. METHODOLOGY AND AIMS

The paper will aim to present the issues of online education, digital skills, digital competences and innovations in education, which currently significantly characterize the processes of learning and education at universities. The ability to apply digital skills and develop them into digital competencies - for both students and teachers - is a basic prerequisite for how to operate effectively and successfully in a virtual online learning environment.

Online education requires from university teachers a gradual transition to adaptation and improvement of professional and pedagogical skills and educational processes, gradual modification of educational processes, resp. to the transformation of forms and methods of education.

The background of the paper should reflect the following question: a) To what extent and how has higher education changed? What are the possibilities of online education during the COVID-19 pandemic and what can be the expectations in the post-COVID period? How does online education reflect the educational needs of university students? b) To what extent digitization has developed in terms of methods, content and pedagogical activities of university teachers? How effective is online education? Has an era of real digitization of education started?

## 3. KEY COMPETENCES

The digital transformation of learning and education at universities requires the so-called building of professional capacities that are linked to new skills and competences, especially key competences for working with digital technologies.

The definition of key competences in the European Higher Education Area took place for the first time in 2006, when the Council and the European Parliament adopted a Document on Key Competences for Lifelong Learning, recommending that the Member States “develop key competences for all as part of lifelong learning strategies and use them” as the so-called European reference framework.”

This document defines competences as a combination of knowledge, skills and attitudes appropriate to a given context. As the names of the eight key competences cannot fully capture the overall framework of knowledge, skills and attitudes that the competence encompasses, a short definition has been developed for each competence. After completion and approval by the European Parliament and the Council of the EU, the original document was issued as a Recommendation on key competences for lifelong learning and was renamed the European Reference Framework.

It contains eight key competencies:

1. communication in the mother tongue;
2. communication in foreign languages;
3. mathematical competence and basic competences in science and technology;
4. competence to work with digital technologies;
5. competence to learn;
6. social and civic competences;
7. a sense of initiative and entrepreneurship;
8. cultural awareness and understanding of artistic expression.

The European Reference Framework defined the competence to work with digital technologies as follows: “Competence to work with digital technologies means a certain and critical use of information society technologies at work, in leisure time and communication. The prerequisite is a basic knowledge of information and communication technologies, i. the use of computers to obtain, evaluate, store, generate and exchange information and to communicate and cooperate within the network via the Internet.”

Digital competence is considered one of the key skills. However, digital competence is a broader and more universal concept, as evidenced by the EU Council Recommendation (2018), which states that digital competence includes components such as information and data literacy, communication and collaboration, media literacy, digital content creation (including programming), security (including digital well - being and cyber security), intellectual property issues, problem-solving and critical thinking.

Individuals with digital competences should demonstrate that they know:

- (a) understand how digital technologies can contribute to communication, creativity and innovation, and should know the opportunities, constraints, impacts and risks they present;
- (b) understand the general principles, mechanisms and logic of evolving digital technologies and know the basic functions and uses of various devices, software and networks,
- (c) have a critical approach to the validity, reliability and impact of the information and data available through digital means and be familiar with the legal and ethical principles associated with working with digital technologies,
- (d) to use digital technologies to promote their active citizenship and social inclusion, cooperation with others and creativity in pursuing personal, social or business goals.

#### **4. INNOVATIONS IN EDUCATION AND ONLINE EDUCATION**

Innovations in education are of particular importance because education plays a crucial role in creating a sustainable future. Serdyukov states (2017) that innovation, therefore, is to be regarded as an instrument of necessary and positive change. Any human activity (e.g. industrial, business, or educational) needs constant innovation to remain sustainable. The author quotes Theodore Levitt, saying that creativity is thinking up new things. Innovation is doing new things.

Serdyukov (2017) states that in education, innovation can appear as a new pedagogic theory, methodological approach, teaching technique, instructional tool, learning process, or institutional structure that, when implemented, produces a significant change in teaching and learning, which leads to better student learning. So, innovations in education are intended to raise productivity and efficiency of learning and/or improve learning quality.

Innovations in education in pandemic can be seen in three steps: Firstly, as an adjustment or upgrading of the teaching process. Secondly, as the modification of the process, as the innovation that significantly alters the process, performance, or quality of an existing product. Thirdly, as the transformation of the system, which represents dramatic conversion (as online education, networked learning and mobile learning).

Today, an overwhelming majority of innovations are tangible, technology tools (laptops, iPads, smartphones) or technology-based learning systems and materials, e.g., learning management system (LMS), educational software, and web-based resources.

The Council Recommendation of 22 May 2018 (2018 / C 189/01) on key competences for lifelong learning stipulates learners need excellent educators to develop the wide range of skills and attitudes they need to live and work. Differences in education and training outcomes depend mainly on individual characteristics and family background. However, teachers and trainers have the greatest influence on students' learning outcomes in educational institutions. They play a key role in introducing new teaching and learning methods, stimulating creativity and innovation, overcoming bias and maximizing potential in increasingly heterogeneous classrooms (p. 16).

Further on, the above document emphasizes the development of the competencies of teaching staff which is a current and increasingly urgent priority of the EU. For these reasons, the Commission will pay attention to innovation in pedagogy, which will include support for flexible curricula, support for interdisciplinary and cooperative approaches, support for professional development to improve innovative learning practices, including the use of digital tools and their contribution to teaching.

The need for an approach to innovate teaching, especially in higher education, with the support of digital technologies, is linked to the forecast that by 2025, half of all EU job vacancies will require higher education qualifications, usually in tertiary education. The skills developed through these training programs are generally considered to be stimuli for productivity and innovation.

The digital competences of teachers and university teachers have been the subject of independent research under the auspices of the Joint Research Centre (JRC) of the European Commission, resulting in the European Framework of Digital Competences for Educators (DigComp) in 2013, revised in 2016 and 2017) face new challenges, they increasingly need wider and more sophisticated sets of digital competences. The ubiquitous digital tools and the role of teachers to help students become digitally competent requires them to develop their digital competences.

The European Framework of Digital Competences for Teachers is a scientifically sound framework for the development of digital competences for teachers, using an agreed common language and approach. It is intended for teachers of all levels and types of schools, from teachers of kindergartens and primary schools, teachers of secondary general and vocational education and training, teachers of special schools, teachers of universities and adult education, as well as in non-formal education. The European framework aims to provide a general model of digital competences for specific model developers in the EU Member States, which should be used in the training and in-service training of teachers and educators.

Their digital competencies cover six areas:

1. Professional engagement refers to the use of digital technologies in a wider professional environment, e. g. in communication with colleagues, students, parents and other parties.
2. Digital resources are subject to search, creation and modification, management, protection and sharing.
3. Teaching and learning relate to teaching, guidance, collaborative learning and self-directed learning.
4. Assessment refers to the use of evaluation strategies, analysis of evidence, feedback and other planning.
5. Strengthening pupils/students refers to the accessibility of education and inclusion (inclusion) of pupils, differentiated and personalized teaching, activation of pupils/students.
6. Facilitation (facilitation) refers to the formation and development of digital competences of pupils/students.

The first and second areas represent the professional competences of the teacher. The second, third, fourth and fifth areas represent the pedagogical competencies of the teacher. The sixth area represents the competencies of the pupil/student.

According to Dudová (2020) digital competence requires proper knowledge and understanding of the nature of the tasks and opportunities of using information society technologies in everyday contexts, personal life, social life, study and work. It includes mastering basic computer applications (word processor and spreadsheet, databases, storing and managing information, understanding the opportunities and potential risks of working with the Internet when sharing information - phishing), understanding the ethical principles and principles of networking and using the information to support their creative and innovative processing.

## 5. SURVEY ON ONLINE EDUCATION

Based on the previous considerations, findings and recommendations the survey on online education was carried out in a target group of university students.

In this part we will present the results of a survey focused on online education at the University of Economics and Public Administration Management in Bratislava.

The survey was conducted in March - April 2021 on a sample of 118 respondents. The respondents were students in the 2nd year of master's studies just before the end of their studies.

### 5.1. Research questions

Research questions were formulated as follows:

1. Do students have enough experience to be able to assess online education? What do they consider to be the biggest advantage and the biggest disadvantage of online education?
2. Have students acquired sufficient skills in online education to be able to assess differences in the readiness of higher education teachers for online education?
3. Can students identify the new requirements that online education places on a university teacher in terms of pedagogical performance in online education, online consultations, processing of educational content in online education (moodle presentations) and creating an atmosphere in online education?

### 5.2. Aim of the survey

The questionnaire survey aimed to find out what are the knowledge and attitudes of students in master study towards online education. The questions focused on online education from the aspect of the student, teacher, content of education and technical platform:

- How do students perceive and characterize online education?
- What do they consider to be the biggest advantage and the biggest disadvantage of online education?
- What new requirements does online education impose on teachers? Does the teacher require special prerequisites and special training?
- Can the content of education be presented to the student clearly and effectively in online education?
- Which are the biggest problems of students in online education?

- How do students evaluate the technical platform in online education and individual consultations?
- Would they support the retention of some elements of online education after the pandemic?

The questionnaire was used in the survey. A questionnaire was specifically created to find out the respondents' opinions on several aspects related to online education. The questionnaire contained 20 questions, in which the respondents could mark 1 answer or more answers. Here, a series of selected questions and relevant answers of respondents will be presented.

### **5.3. Survey results**

Researched issues were divided according to the areas they covered, so author was interested in answers about the characteristics of online education, students' experiences with online education, assessing the capacity and readiness of teachers for online education (digital competences, communication with students, atmosphere in online teaching, barriers in online learning), assessment of the advantages and disadvantages of online education, assessment of the technical platform used for online education and online consultations.

### **5.4. How do respondents characterize online education?**

Respondents were able to use the following characteristics of online education in their response:

- a) Distance learning is online teaching through a technology platform based on information and communication technologies (webex, teams, zoom, skype, etc.)
- b) Distance education is online teaching using technical means and methodological procedures, through which the teacher presents the curriculum (content of education) and evaluates study results.
- c) Distance education as online teaching is an innovation in higher education.

They could make a multiple-choice of alternative answers.

The results show that respondents used all three alternatives and reported all combinations of responses. They are able to adequately characterize online education. It was important to find out that they accept online education as a pedagogical innovation in higher education.

### **5.5. How do respondents evaluate online education in terms of their own experience?**

Respondents had to choose one answer:

- a) Online education suits me overall.
- b) Online education suits me better than it does not.
- c) I consider online education to be equivalent to full-time education.
- d) Online education does not suit me more than it does.
- e) Online education does not suit me.

Respondents stated that online education suits them overall - a) with 50 points, b) with 29 points. Some of the respondents consider online education to be equivalent to full-time education. Only 14 respondents stated that online education did not suit them more than it suits them and 3 respondents stated that online education does not suit them.

## 5.6. How do respondents perceive the difference between online education and full-time education?

Do you think that the content of education in online education can be presented to the student as clearly and effectively as in full-time education? Respondents had to choose one answer:

- a) Yes.
- b) Rather yes.
- c) I can't judge.
- d) Rather not.
- e) No.

The most numerous answers were alternatives a) with 37 points, b) with 32 points, d) with 17 points. This means that in terms of learning outcomes, respondents do not consider online learning and full-time learning to be different (answers a) plus b) scored 69 points). Only 4 respondents said that they could not answer the question. On the contrary, the answers d) with 17 points and e) with 2 points (a total of 19 points) suggest that a certain group of respondents see the difference between online education and full-time education, respectively. They are critical of online education.

## 5.7. What do respondents see as the biggest advantage of online education?

The question was: What do you consider to be the biggest advantage of online education? The respondents could mark multiple answers:

- a) Possibility to study at home.
- b) Possibility to save time and not move to university premises.
- c) Opportunity to study online and achieve equally recognized study results.
- d) The moodle system contains everything I need to successfully complete the study.
- e) Our university has responded well to the pandemic situation and provides a full-time replacement for full-time study through online education.
- f) Other (fill in):

The most marked were the alternatives b) with 70 points, a) with 62 points, followed by e) with 53 points, c) with 49 points and d) with 36 points.

This means that respondents value time savings and study results that they consider equally recognized. They also appreciate the university's rapid response to the outbreak of the pandemic and the immediate transition to online education. With this measure, they were able to continue their studies and meet the conditions for completing individual subjects.

## 5.8. What do respondents see as the biggest disadvantage of online education?

The question was: What do you consider to be the biggest disadvantage of online education? Respondents could mark several alternative answers:

- a) Lack of communication with the teacher about the content of education.
- b) Lack of suggestions from classmates.
- c) Weak exchange of information and little interaction from classmates.
- d) Excessive social isolation between individual participants in online education.
- e) Online learning does not provide any opportunity to work with classmates.
- f) Other (fill in):

They received the most ratings d) with 52 points, c) with 41 points, b) with 39 points, followed by a) with 30 points and e) with 15 points. This suggests that respondents are aware of the importance of social contact with classmates in their studies, as they receive many stimuli and help from successful classmates in perceiving education to perceive and evaluate issues related to the content of education. It is important to note that in online education, they also perceive a lack of communication between teachers and students in terms of the content of education. Many people are afraid to formulate questions in online teaching and ask them to the teacher when they do not perceive the verbal or non-verbal support of classmates that is characteristic of full-time education.

### **5.9. How do respondents evaluate online education based on their experience?**

Based on my own experience, I consider online education to be:

- a) an excellent instrument of training.
- b) a very good instrument of training.
- c) a good instrument of training.
- d) a satisfactory instrument of training.
- e) an unsatisfactory training of training.

Respondents gave the most points to alternatives b) with 30 points and c) with 30 points, followed by a) with 25 points. Other alternatives: d) with 6 points and e) with 1 point. Although a positive evaluation of online education prevails (alternatives b plus c), a significantly smaller proportion of respondents described online education as an excellent tool for education. This suggests that, in its current form, online education has certain shortcomings and reservations.

### **5.10. How do respondents perceive the readiness of a university teacher for online teaching?**

In online education, I noticed that new requirements are placed on the teacher?

Respondents had a choice of several answers:

- a) The teacher should also have technical skills and work with WEBEX.
- b) The teacher should align the spoken word with technical support.
- c) The teacher should emphasize the goal of education at the beginning of the lesson.
- d) The teacher should use the presentation appropriately and supplement it with current information.
- e) The teacher should motivate students to learn by activating questions, continuous evaluation of students' answers, evaluation of student presentations, etc.

According to the respondents' assessment, the most points were attributed to alternatives a) with 73 points, b) 52 points, d) 42 points, e) 31 points and c) with 18 points.

This suggests that respondents (students) do expect and require from the teacher technical skills in working with the technical platform WEBEX while linking and supplementing online presentations with current information on the presented topic, motivational incentives, continuous evaluation of students' answers and the ability to immediately evaluate students' online presentations (if any). case occurs). We can state that students have very clear expectations regarding teachers' pedagogical skills, which must be complemented by technical skills and the ability to work with a technical platform suitable for online education.



### 5.11. The proper preparation of the teacher for online education?

The aspect was examined by the question: Do you think that online education requires special preconditions for the teacher? Respondents could indicate several options:

- a) He/she should make more use of non-verbal (non-verbal) keys (eg smile than positive feedback).
- b) He/she should involve students more in communication and information exchange.
- c) He/she should make more use of students' judgment.
- d) He/she should make more use of student experiences.
- e) He/she should build more on the imagination of students.

Respondents marked the answers in the following order: b) with 55 points, a) 42 points, the alternatives c) with 13 points, equally the alternative e) with 13 points, d) with 11 points. These results suggest that students in online education also expect those teacher activities that are more typical of full-time education (as teacher questions and students' answers, group communication and information exchange, student assessment of problems, application of experiences, problem solving and use of imagination). A significant requirement applies to the non-verbal communication and non-verbal keys of the teacher (smile as positive feedback or as an expression of creating a positive atmosphere in teaching).

### 5.12. How do respondents perceive and evaluate special teacher training for online education?

Do you think that a teacher should be specially prepared for online education? Respondents had to mark one answer:

- a) Every teacher needs special preparation for online education.
- b) Some teachers need special preparation for online education.
- c) Teachers do not need special training for online education.

Respondents marked c) with 59 points, b) with 24 points and a) with 9 points.

This finding is very important, as it confirms that respondents expect a smooth (trouble-free) mastery of the role of the teacher in online education, especially in mastering the technical platform of online education. They require teachers to be specially trained for this task. This is a stimulus for teachers themselves and university management in the field of academic growth and the development of comprehensive pedagogical skills of teachers during and after the COVID-19 pandemic.

### 5.13. What causes the teacher the biggest problem in online education?

Respondents could mark several answers:

- a) Focus on teaching (fluctuating attention).
- b) Difficulty of the curriculum.
- c) Running the teacher away from the topic.
- d) Length of a lesson (could be shorter).
- e) Excessive teacher focus on moodle presentation.

Respondents gave the most points alternative a) with 64 points, followed by d) with 33 points, e) with 22 points, b) with 11 points and c) with 5 points. The results suggest that students closely observe the teacher's activities during online teaching (attention fluctuation), but they can also assess the complexity of the curriculum, which in connection with the need to master the technical side of online education places special demands on the teacher.

#### **5.14. What suits respondents in online teaching in terms of teacher performance?**

Respondents were requested to consider the following: In online education, it suits me that:

- a) The teacher sticks to the presentation and emphasizes the most important thing by voice.
- b) The teacher is able to explain the theory and provide practical examples.
- c) The teacher can verbally (by voice) emphasize what I should pay attention to.
- d) The teacher does not let himself be disturbed by the behaviour of students, because he usually does not see them.
- e) The teacher has his teaching goal and goes for it.

Respondents had the option to choose multiple answers. They expressed their assessment as follows: b) with 55 points, a) with 49 points, c) 45 points, e) with 36 points and d) 32 points. It turned out that the most important aspects of a teacher's performance are the ability to explain the theory and supplement it with practical examples, the use of non-verbal keys (voice) in teaching while sticking to the set educational cognitive goals.

#### **5.15. What do respondents value most about the teacher in online education?**

They should have marked multiple answers:

- a) The teacher is always well prepared for online education.
- b) The teacher is in a good mood.
- c) The teacher is able to link current information with the content of online education.
- d) The teacher has well-thought-out assignments for students and is able to explain them clearly.
- e) The teacher allows students to publish the prepared presentations.

The most points were attributed to alternative answers a) with 67 points, followed by c) with 59 points, b) with 56 points, d) with 45 points and e) 24 points. Respondents confirm that the professionalism of teachers remains the most important aspect of online education, both in terms of content and ways of presenting the curriculum, cooperation with students and making the results of their work (assignments) public.

#### **5.16. Respondents' opinions on teacher's performance?**

Respondents were asked to assess the teacher's performance based on the following statements:

In online education, I noticed that:

- a) The teacher performs just as well as in full-time teaching.
- b) The teacher must be extremely focused on online teaching in order to achieve the same performance.
- c) The teacher is subject to the influence of the environment and disturbance, which disrupts his performance.

- d) The teacher follows the curve of student fatigue, therefore he inserts activating questions for students into the interpretation.
- e) The teacher is able to provoke and lead a dialogue with students.

The highest number of points was obtained by alternatives a) 64 points, followed by e) 37 points, b) 32 points, d) with 21 points and c) with 13 points. This suggests that respondents (students) pay the most attention to and evaluate teachers' performance in online teaching, their ability to engage in dialogue with students, the teacher's focus on performance in the online environment, the ability to activate students with questions and possible environmental and disruptive influences.

### 5.17. Assessment of survey results

Based on the obtained results, author state that the students in the period March 2020 - March 2021 gained enough experience to answer all questions in a relevant way.

Online education was suitably characterized by respondents as the teaching through a technology platform, the use of technical means and methodological procedures, through which the teacher presents the curriculum (content of education) and evaluates study results and innovation in higher education.

They identified the possibility of saving time, not moving to university premises and studying at home, as the biggest advantage of online education. They also expressed the satisfaction that the university responded well to the pandemic situation and started to provide a full-fledged replacement for full-time study through online education.

The biggest disadvantage of online education was excessive social isolation between individual participants in online education, weak exchange of information and little interaction from classmates, and the lack of communication with the teacher about the content of education.

If teachers can combine the cognitive side of educational content with the technical skills necessary for online learning, they gain respect and recognition from students.

In the answers, the respondents generalized their experience and knowledge of the teaching styles of several teachers who taught in the online education system during that period. Therefore, their scoring is of considerable importance and can lead to several recommendations:

- Online learning requires teachers to be precisely trained and innovated in the ways they present their content.
- Under the pandemic conditions, pedagogical innovation in online education has rapidly passed from the adjustment and upgrading of the teaching process, through innovations altering the process, performance and quality of the ways of teaching and at present, the pedagogical innovation aims at the transformation of the system that represents a dramatic conversion.
- Therefore, teachers need to continuously improve their pedagogical and technical skills and face cope with new challenges associated with online education.

## 6. FUTURE TRENDS IN RESEARCH

The survey indicated the future trends in research that could be focused on some other research questions combined with the online education (Matúšová, 2021):

- What has the pandemic in higher education changed?
- What are the possibilities of online education during the COVID-19 pandemic and what can be the expectations in the post-COVID period? How does online education reflect the educational needs of students of individual levels of study, fields of study and subjects?
- To what extent has the digitization of education achieved in terms of methods, content and pedagogical activities of teachers? What new demands on the management of education and pedagogical staff have been caused by the time of COVID-19?
- How effectively is online education applied in current practice at universities? Is there an era of real digitization of education?
- How does the management of higher education institutions react and reflect on the changes caused by the pandemic situation in the approach to the education of students (young adults)? How does university management ensure and monitor the quality of education, which takes place in the form of online education with technical support? How does online education affect the quality of education? What measures need to be taken to maintain the required level of quality of education?
- How do pedagogical staff cope with the new requirements of online education in terms of the content of subject education and the need for pedagogical innovation?

## 7. CONCLUSION

A pilot questionnaire survey confirmed that students understand and can properly address the issue of online education. They are sensitive to the differences between presence and online education, aware of significant advantages and disadvantages of online education. University teachers who apply technical platforms for online education are judged soberly. Students appreciate their preparation for online education, the way of presenting the content, communication with students, creating an atmosphere facilitating interaction among students, the possibility of presenting their assignments via technology platforms.

Respondents were well aware of the new demands placed on teachers in online education, which relate to mastering the topic, its new way of presentation in teaching, the need to apply activation questions to students, the ability to conduct dialogue, to link theory and practice. They especially appreciate the teacher's ability to work with the technical platform of online education, synchronized connection of the image (presentation) and the teacher's interpretation, explanation. They draw attention to the need for special training of teachers to work with the technical platform of online education.

## ACKNOWLEDGEMENT

The paper was supported by Vysoká škola ekonómie a manažmentu verejnej správy v Bratislave, the project Managerial Competencies and Innovations in Education in Post-Covid 19 (project number 3/2021-M).

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