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# PERCEPTIONS' INVESTIGATION REGARDING THE NEED FOR UPSKILLING IN REMOTE EDUCATION: A PLS-SEM ANALYSIS

***Abstract.*** *This paper explores the evolving landscape of education, focusing on the challenges posed by the shift to online learning. It investigates the essential skills required by remote educators and trainers, drawing insights from individuals seeking to enhance their virtual teaching abilities. The cost-effectiveness and adaptability of remote education are discussed, alongside the crucial role of technology in enhancing learning outcomes. The paper emphasizes the concerns regarding generational skill gaps and the need for educators to transition to online teaching. Critical competencies for remote education, such as critical thinking, collaboration, communication, creativity, and cultural awareness, are highlighted. The study employs Partial Least Squares Structural Equation Modeling (PLS-SEM) for analysis, contributing insights from diverse global perspectives. The paper concludes with implications and recommendations for future research.*

***Keywords****: remote education, upskilling, competencies, PLS-SEM*

**JEL Classification: I25, M10, M12, M53, O32.**

## 1. Introduction

In recent years, the education system has undergone significant changes, presenting new challenges for both educators/trainers and students/trainees. The shift to online education has been particularly impactful, requiring a different approach than traditional methods. Therefore, there have been diligent efforts to identify the new skills that teachers and students need to develop to adapt to the extended use of online education. Hence, extended research and surveys have been initiated to specifically find what are the newly required competencies for effective learning and teaching.

Since the professional competencies of remote educators in all fields (including economics) contribute to the overall quality of online education and the success of virtual learning environments, there is a great deal of research focused on developing appropriate and effective training for teachers. The need to organise training for teachers to acquire remote teaching skills became particularly evident during the pandemic of the COVID -19 virus. Many teachers find themselves in a situation of emergency remote teaching, lacking the knowledge and skills to incorporate digital technologies into the teaching and learning process. The training provided during the pandemic is likely to have long-term implications for the professional development of remote educators.

Remote education is effective, low-cost, and flexible for diverse learning styles. Nevertheless, specific technologies, platforms and other remote/digital tools have become instrumental in delivering effective education adapted to particular circumstances of secondary, tertiary and lifelong education. Though not new in the global education system, digital tools allow for flexibility in education but, when interconnected with teaching materials, the learning outcomes are enhanced. Today, e-learning is often used as a synonym for remote learning. While remote learning is a situation that involves physical separation between students and teachers (educators), e-learning is a broader term that encompasses all forms of learning using electronic devices and digital resources. In our research, we focus on remote education that is supported by information and communication technology.

Although remote education has been widely accepted, it raises concerns about intergenerational the skills gap and the urgent need for most educators to shift from traditional to online teaching and training. Asynchronous learning faces other challenges, such as cultural differences, the speed of acceptability, and digital skills, which have been brought to the forefront by the recent pandemic crisis, despite being long considered the future of education. Among the necessary skills listed for remote education are critical thinking, collaboration, communication, creativity, citizenship (or cultural awareness), and connectivity (or character education).

The aim of the paper is to verify what are the skills that remote educators/trainers need, relying on perceptions of employees interested in upskilling their competencies as virtual educators/trainers following their experience during the pandemic. Since the respondents are related to the economic field, the analysed skills can be extended to a large area of fields, economics education included. Consequently, we tested six hypotheses regarding participation in training, professional competencies, digital competencies, self-management and organization skills, collaboration competencies, interpersonal, intercultural and communication skills, and specific skills for remote teaching (as remote work).

We used the partial least square structural equation modelling (PLS-SEM) technique to verify our research model. It allowed us to establish the connections between the indicators and their corresponding latent constructs in the measurement model, as well as the connections between the constructs in the structural model. Furthermore, we investigated the predictive relevance of the endogenous latent variables. To conduct the analysis, we employed SmartPLS software.

## 2. Literature Review

Professional competencies of educators for teaching and facilitating learning in online or remote education environments go beyond traditional teaching skills. Al-Naabi, Kelder & Carr (2021) identified three major topics for teacher education based on a literature review: Critical Elements of an Online Classroom, Best Practices in an Online Environment, and Creating Learning Modules. The authors used these topics to develop a model for online and hybrid teacher training aiming to empower teachers to develop online courses, model best practices for online learning, and place teachers in the same role as their future students.

Research in the field emphasizes the importance of organizing training to develop remote teaching skills entirely online or with a blended learning approach to provide flexibility and allow participants to engage in learning activities similar to those they plan for their students. Examples of training indicate that achieving such knowledge and skills is possible. Kmeta & Bjekić (2015) described experiences from the Tempus project NeReLa, which aimed to empower secondary vocational teachers to use modern technologies in remote teaching. During the project, face-to-face and online trainings were organised and teachers were taught how to incorporate distance learning into their teaching. The evaluation results confirmed the success of the organized training. Teachers recognized many benefits of the training, including the benefits for the development of their professional competencies. Sáiz-Manzanares et al. (2022) reported the results of a satisfaction survey on a blended learning training organized to support teachers in how to use virtual learning environments, including avatars, gamification, and evaluation tools. Participants were content with the training and no significant differences were found between inexperienced and experienced teachers. Evans et al. (2020) used a blended learning model to enhance the use of Blackboard LMS in a continuing education course. By comparing the teachers' activity level in the data log in the LMS before and after participating in the training, a positive effect of professional development on their teaching practice was found. Teachers who participated in the training were more active, and a significant increase in the number and types of tools used during their online teaching was noted, particularly tools that allow students to communicate, interact, and contribute online.

Although examples of teachers' training aimed at developing skills for remote education and exchange of examples of good practice, in most cases no research has been conducted on the impact on teachers’ professional skill development, but only the results of the conducted satisfaction survey are reported.

From the perspective of the digitization process, more and more emphasis is placed on the development of digital skills in the educational process. Although new digital competence technologies have been developed, the changes brought to digital education applied in the educational process are in full development. Digital competencies (DC) are defined by Martin et. all (2006) as "the awareness, attitude and ability of individuals to appropriately use digital tools and facilities to identify, access, manage, integrate, evaluate, and synthesize digital resources, construct new knowledge, create media expressions, and communicate with others, in the context of specific life situations, to enable constructive social action; and to reflect upon this process." Also, DC is described as the "ability to understand and express through making analytical, productive, and creative use of the information technologies and social software to transform information into knowledge" by Torres-Coronas & Vidal-Blasco (2011). DC is defined by Ferrari, et al. (2014) as the use of ICT tools to achieve goals in the learning process. Issues related to digital competence and literacy have been debated at many levels and papers during the past few years.

We are currently witnessing a series of changes resulting from innovation in digital education related to educational platforms and the use of artificial intelligence (AI) in the educational process that requires the development of digital skills. Digital technology is currently causing a qualitative revolution in the educational system. (Oberländer, et al., 2020). The adoption of digital technology is essential in the process of adapting the educational system to the needs of the digital economy (Zabolotska, et al., 2021). All these definitions highlight that DC is a complex concept that has a very general use in the educational system.

The assumption that skills used in office work can be applied to remote work ('same skills, different environment') is also supported by research (Henke et al., 2022). The same authors researched factors that contribute to successful remote work (albeit not specifically for remote teachers). Nevertheless, participants cited setting a 'normal work schedule' as the most beneficial behaviour for successful remote work. We could say that this factor belongs to self-management and organization, specifically to 'time management' skills. Although Lukashenko (2021) argues that self-management contributes to students in their e-learning endeavours, it can be hypothesised that all remote tasks (such as remote teaching) benefit from self-management. Costantini & Weintraub (2022) found out while surveying 329 remote workers that self-leadership allows higher availability of resources, enabling the proactive initiation of social interactions and improving task significance during remote work. Also, Manasia et al. (2019) suggest that self-management (alongside professional knowledge and practice and professional engagement) could be considered a central dimension of teachers' job readiness.

It is important to integrate the 6Cs of the 21st Century Education into the training programs for remote workers, like educators, managers or trainers (Karim, et al., 2021). The following competencies are considered: critical thinking, collaboration, communication, creativity, citizenship (or cultural awareness) and connectivity (or character education). According to Martin & Bradbeer (2016), trainers should use different pedagogies to meet the needs of all learners and to create a collaborative, supportive learning environment. Collaboration in remote work environments implies synchronous and asynchronous interactions and tasks to achieve common goals. According to Wiliam & Leahy (2015), peer collaboration leads to more successful learning in the classroom, and therefore the competencies of educators in this direction must be upskilled. Regardless of whether one refers to a remote trainer or educator, one must encourage internal collaboration within the group/team one works with. One's ability to work together with the group requires certain professional skills (collaboration included) (Hadi, et al., 2023). Efficient collaboration implies interpersonal trust and objectivity toward peers' opinions (Kulic & Jancovik, 2022). Based on the above, it can be concluded that when remote work-related professional skills are analysed, collaboration capabilities (CC) are also considered.

Remote teaching and learning pedagogies require a set of skills transcending the professional ones. Tusyanah et al. (2023) draw attention to the role of online collaborative learning, which, once implemented in class might improve interpersonal communication and cognitive performance. Borge et al. (2022) discuss the necessity of multicultural collaborative skills based on joint ideas and understanding-building as well as collective knowledge and collaboration that can also support remote education. Improving remote educators' capabilities relies, among others, on interpersonal, intercultural and communication skills. Liubarets et al. (2022) consider that creative thinking and independent interpersonal as well as intercultural communication skills are essential for economists who work in the digital space. Over the last decades, business professionals have frequently been asked to accommodate a culturally diversified environment in a globalised market, being challenged to acquire intercultural skills. Hence, economic and business education started to include intercultural skills in their curricula. Such an experience cannot go amiss in digital and remote education, given the global ecosystem provided by the internet. Schartel-Dunn & Lane (2019) stress the importance of communication skills

(including writing and grammar, teamwork, reporting, horizontal and hierarchical interpersonal skills, etc.), for business students which arguably, presently, extends to using remote education. Miller &Tucker (2015) addressing the issue of critical thinking in intercultural contexts in distance learning bring forward the necessity to foster these skills, equipping students with the ability to learn in an asynchronous environment. Authors (Gayathridevi & Deepa, 2015) also discuss the effectiveness of business communication skills showing that most higher education institutions around the world are constantly preoccupied with improving their students' communication skills which have been proven successful and that, undoubtedly can be translated into remote learning. The migration of economic courses online, stresses the need to improve communication skills that can be enhanced by relating to best practices in online negotiations as stated by (Pauletto, 2023). Technical know-how, pedagogical skills, and adaptability are all necessary for effective remote teaching. The interaction between educators' professional competencies and their specialized skills in the context of remote instruction is interesting to be studied. Emergency distance learning had both advantages and disadvantages compared to face-to-face instruction. The participants' opinions on the level of technology proficiency they should possess for their employment are changing, as evidenced by the digitalization of the educational environment brought about by distant learning. Consequently, the 21st-century skills of the participants are not significantly affected by distance education. However, the value and necessity of twenty-first-century abilities in the online education process become clearer (Bozgun et al., 2023). It is important to develop a set of pedagogical principles, to get together to discuss best practices and to encourage and support action research among videoconference teachers (Rehn et al., 2018).

## 3. Methodology and Analysis

### *3.1. Research Hypotheses and Conceptual Model*

Remote teachers, beyond the similar qualifications as in-classroom teachers, need supplementary skills in the online environment. It is important to understand the specificity of remote teaching, to plan and adapt the learning materials accordingly, and to manage efficiently the process of remote learning (Henke, Jones & O'Neill, 2022). Therefore, it is necessary to train remote educators continuously along with the developments and evolutions in the digital economy.

Based on the literature review (Table 1), we formulated six hypotheses and proposed a research model that contains the following constructs (Figure 1): participation in training, professional competencies, digital competencies, self-management and organization skills, collaboration competencies, interpersonal, intercultural and communication skills, and specific skills for remote teaching.

There is a continuous research interest in the development of professional competencies for remote work (Table 1), and various aspects of the problem are addressed. Both educators and trainers need an integrated package of skills in the online environment to carry out their activities. As such, their involvement in specialized training is required.

**Table 1. Hypotheses and literature references**

| Hypotheses | References |
|---|---|
| H1 | Kmeta & Bjekić (2015); Evans et al. (2020); Naabi, Kelder & Carr (2021); Sáiz-Manzanares et al. (2022); |
| H2 | Martin et. all (2006); Torres-Coronas & Vidal-Blasco (2011); Ferrari, A., et.all. (2014); Oberländer, et. al. (2020); Zabolotska et. al (2021). |
| H3 | Manasia, et. al. (2019); Lukashenko (2021); Henke, et al. (2022); Costantini & Weintraub (2022); |
| H4 | Wiliam & Leahy (2015); Martin & Bradbeer (2016); Kulic & Jancovik (2022); Hadi, et al (2023). |
| H5 | Miller & Tucker (2015); Gayathridevi & Deepa (2015); Schartel-Dunn & Lane (2019); Borge et al. (2022); Liubarets et al (2022); Tusyanah et. al (2023); Pauleto (2023); |
| H6 | Rehn et al. (2018); Bozgun et al. (2023); |

Source: Authors' analysis

In our approach, we brought together different skills and abilities, establishing a portfolio of professional competencies for remote teachers. With these considerations, the constructs were substantiated, the hypotheses were formulated and the research model in Figure 1 was proposed.

(1) H1. **Participation in training** (PT) for acquiring remote work skills and best practices has a significant positive influence on the **professional competencies** (PC) of remote educators.
(2) H2. Remote educators with high professional competencies are more likely to have high **digital competencies** (DC).
(3) H3. Remote educators with high professional competencies are more likely to have **high self-management and organization skills** (SMOS).
(4) H4. Remote educators with high professional competencies are more likely to have high **collaboration competencies** (CC).
(5) H5. Remote educators with high professional competencies are more likely to have high **interpersonal, intercultural and communication skills** (IICS).
(6) H6. Remote educators with high professional competencies are more likely to have high **specific skills** for remote teaching (SS).

To test the hypotheses, we use the quantitative research method. Hence, a questionnaire was launched that covers all the considered research dimensions. The questionnaire was disseminated online from April 17th to June 20th 2023 and all the indicators were measured on a five-point Likert scale, from 1 (strongly disagree) to 5 (strongly agree).

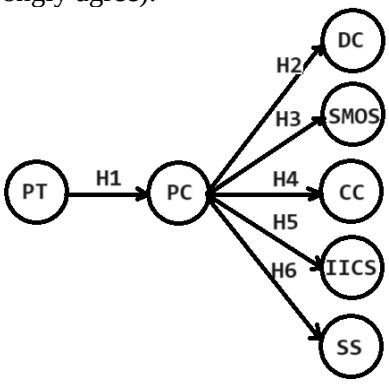


**Figure 1. The research model** source: Authors' proposal

Our target group consisted of employees interested in upskilling their competencies as virtual educators/trainers. 288 valid answers were collected (Table 2). Several European countries and a variety of industry/business sectors are covered. 46.53% of the respondents are remote workers, 36.46% are remote educators, and 17.01% are remote managers. They belong to different active age groups

**Table2. Respondents' information**

| Characteristic | Category | Frequency | % |
|---|---|---|---|
| Gender | Female | 173 | 60.07% |
| | Male | 111 | 38.54% |
| | NA | 4 | 1.39% |
| Age | < 25 years | 50 | 17.36% |
| | 25 - 35 years | 66 | 22.92% |
| | 35 - 45 years | 82 | 28.47% |
| | > 45 years | 90 | 31.25% |
| Country | Romania | 178 | 61.81% |
| | Slovenia | 9 | 3.13% |
| | Austria | 7 | 2.43% |
| | Croatia | 86 | 29.86% |
| | Other UE countries | 6 | 2.08% |
| | Non-UE countries | 2 | 0.69% |
| Industry sector | Banking | 3 | 1.04% |
| | Consulting | 27 | 9.38% |
| | Creative services | 9 | 3.13% |
| | Digital Marketing | 1 | 0.35% |
| | Financial services, Accounting | 20 | 6.94% |
| | Higher education | 102 | 35.42% |
| | Informal education | 6 | 2.08% |
| | IT | 44 | 15.28% |
| | Primary and Secondary education | 23 | 7.99% |
| | Public administration | 4 | 1.39% |
| | Research | 14 | 4.86% |
| | Translating, proofreading | 2 | 0.69% |
| | Other | 33 | 11.46% |
| Remote work | Remote educator | 105 | 36.46% |
| | Remote manager | 49 | 17.01% |
| | Remote worker | 134 | 46.53% |
| Organisation size | <10 employees | 29 | 10.07% |
| | 10-50 employees | 64 | 22.22% |
| | 50-100 employees | 20 | 6.94% |
| | >100 employees | 175 | 60.76% |

Source: Authors' analysis

### *3.2. Analysis and Results*

For the analysis, we applied the partial least squares structural equation modelling (PLS-SEM) method to validate the research model (Figure 2).

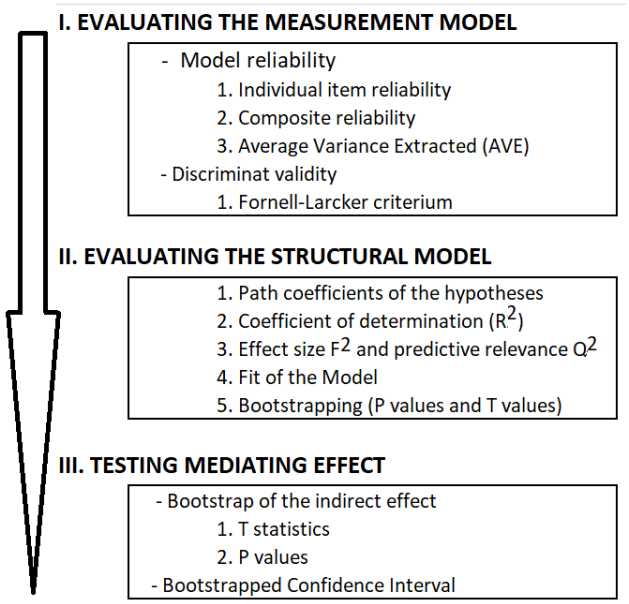


**Figure 2. PLS-SEM steps** (adapted from Fehan & Aigbogun, 2020)

We determined the correlation of the indicators and their corresponding latent constructs in the measurement model and the relationships between the constructs in the structural model. We also analysed whether there is a predictive relevance of the endogenous latent variables SmartPLS software was used to perform the analysis.

#### *3.2.1 Evaluating the Measurement Model*

- Model reliability

The items' reliability can be determined from the outer loadings and the values need to be above 0.70 for confirmatory research (Henseler, 2018). All items have outer loading values greater than 0.70, which means that they have a substantial contribution to their assigned constructs (Table 3).

**Table 3. Outer loadings**

| | CC | | | DC | | | IICS | | | PT | | | SMOS | | | SS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CC1** | 0.855 | | **DC1** | 0.732 | | **IICS1** | 0.841 | | **PT1** | 0.737 | | **SMOS1** | 0.773 | | **SS1** | 0.877 |
| **CC2** | 0.882 | | **DC2** | 0.782 | | **IICS2** | 0.845 | | **PT2** | 0.818 | | **SMOS2** | 0.788 | | **SS2** | 0.868 |
| **CC3** | 0.885 | | **DC3** | 0.717 | | **IICS3** | 0.878 | | **PT3** | 0.792 | | **SMOS3** | 0.778 | | **SS3** | 0.886 |
| **CC4** | 0.868 | | **DC4** | 0.774 | | **IICS4** | 0.897 | | **PT4** | 0.835 | | **SMOS4** | 0.778 | | **SS4** | 0.902 |
| **CC5** | 0.814 | | **DC5** | 0.718 | | **IICS5** | 0.857 | | **PT5** | 0.83 | | **SMOS5** | 0.811 | | **SS5** | 0.881 |
| | | | | | | | | | **PT6** | 0.662 | | **SMOS6** | 0.748 | | **SS6** | 0.873 |
| | **PC** | | | | | | | | | | | **SMOS7** | 0.821 | | **SS7** | 0.854 |
| **PC** | 1 | | | | | | | | | | | **SMOS8** | 0.799 | | **SS8** | 0.876 |

Source: Authors' analysis with SmartPLS software

Internal consistency reliability is the extent to which indicators measuring the same construct are associated with each other (Table 4). The recommended values for rho_c and rho_a are greater than 0.70. Cronbach's alpha coefficient is associated with reliability or internal consistency. The coefficient value is normally seen as ≥0.70 (five instances) or >0.70 (three instances). AVE indicator values show, on average, how much variation in the associated items can be explained by the construct. Values greater than 0.50 are recommended.

**Table 4. Composite reliability and AVE values**

| Construct | Composite reliability (rho_c) | Composite reliability (rho_a) | Cronbach's alpha | Average variance extracted (AVE) |
|---|---|---|---|---|
| **CC** | 0.935 | 0.915 | 0.913 | 0.742 |
| **DC** | 0.862 | 0.816 | 0.804 | 0.555 |
| **IICS** | 0.936 | 0.917 | 0.915 | 0.746 |
| **PT** | 0.903 | 0.884 | 0.871 | 0.611 |
| **SMOS** | 0.929 | 0.917 | 0.912 | 0.620 |
| **SS** | 0.964 | 0.963 | 0.957 | 0.769 |

Source: Authors' analysis with SmartPLS software

- Discriminant validity

Discriminant validity assumes that "should correlate higher among them than they correlate with other items from other constructs that are theoretically supposed not to correlate" (Henseler, 2018). Discriminant validity can be established using the Fornell-Larcker criterion (Table 5).

**Table 5. Fornell-Larcker criterium**

| | **CC** | **DC** | **IICS** | **PC** | **PT** | **SMOS** | **SS** |
|---|---|---|---|---|---|---|---|
| **CC** | 0.861 | | | | | | |
| **DC** | 0.645 | 0.745 | | | | | |
| **IICS** | 0.621 | 0.604 | 0.864 | | | | |
| **PC** | 0.235 | 0.217 | 0.251 | 1 | | | |
| **PT** | 0.632 | 0.608 | 0.697 | 0.314 | 0.781 | | |
| **SMOS** | 0.767 | 0.794 | 0.64 | 0.239 | 0.669 | 0.787 | |
| **SS** | 0.666 | 0.659 | 0.649 | 0.23 | 0.701 | 0.679 | 0.877 |

Source: Authors' analysis with SmartPLS software

*3.2.2 Evaluating the Structural Model*

- Path coefficients of the hypotheses

The path coefficients show the connectivity between the two constructs. All path coefficients are greater than 0.1 meaning that all relationships between the latent variables are statistically significant (Figure 3).

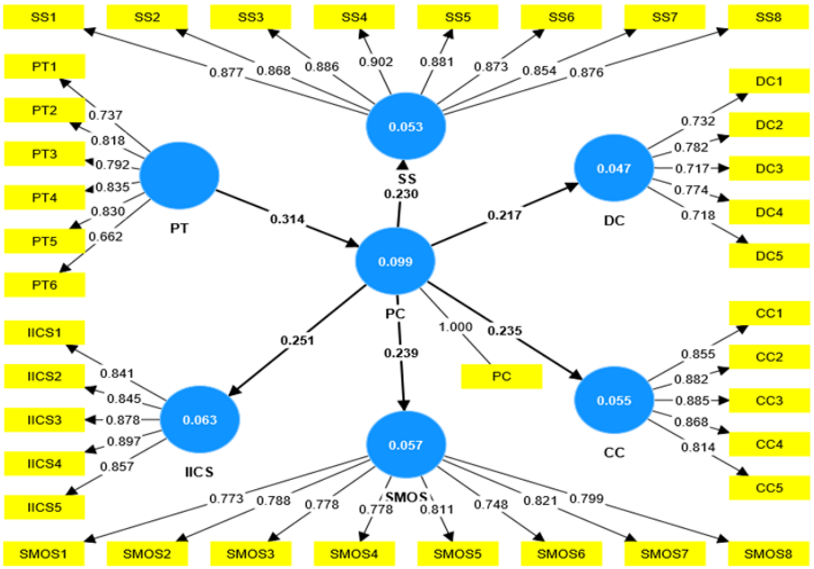


**Figure 3. PLS-SEM Analyse**

Source: Authors' analysis with SmartPLS software

- Coefficient of determination ($R^2$)

From the model diagram (see Figure 3), the overall $R^2$ is found to be weak. According to Henseler (2018), acceptable $R^2$ values are based on the research context, and "in some disciplines, an $R^2$ value as low as 0.10 is considered satisfactory". As mentioned in Ozili (2023), such small values of $R^2$ "are acceptable on the condition that some or most of the predictors or explanatory variables are statistically significant" (Figure 3).

- Effect size $F^2$ and predictive relevance $Q^2$

Applying Cohen's $f^2$ method of effect size, we obtained the following values for $F^2$ indicating a small effect size (Table 6). Construct PC has a small impact on the other constructs (DC, SMOS, CC, IICS, SS), while PT has a medium impact on PC. $Q^2$ represents the predictive relevance and shows if the model has or does not have predictive relevance. Our $Q^2$ values are above zero indicating that the model has predictive relevance.

**Table 6. Effect size $F^2$ and $Q^2$ values**

| | **Path coeficients** | **$F^2$** | **$Q^2$** |
|---|---|---|---|
| **PT -> PC** | 0.314 | 0.11 | 0.085 |
| **PC -> DC** | 0.217 | 0.049 | 0.078 |
| **PC -> SMOS** | 0.239 | 0.061 | 0.094 |
| **PC -> CC** | 0.235 | 0.059 | 0.087 |
| **PC -> IICS** | 0.251 | 0.067 | 0.103 |
| **PC -> SS** | 0.23 | 0.056 | 0.096 |

Source: Authors' analysis with SmartPLS software

- Fit of the Model in SmartPLS

We are using the standardized Root Mean Square Residual (SRMR) that is calculated in SmartPLS. According to Henseler et al. (2018), SRMR is a goodness-of-fit measure for PLS-SEM and

values less than 0.10 are considered a good fit. We obtained a value of 0.054 for the saturated structural model.

- Bootstrapping

According to Henseler (2018), "From a statistical explanatory modelling point of view, hypothesis testing is a critical element in developing relevant and rigorous theory. In a PLS-SEM context, hypothesis testing relies on bootstrapping". The recommendations refer to using P values and the bootstrap confidence interval. If $P \leq 0.05$ the hypothesis is accepted, otherwise it is rejected. Alternatively, the T statistic can be used, and values greater than 2.00 are statistically significant (Table 7).

**Table 7. Validation of the hypotheses**

| | **T statistics** | **P values** | **Remark** |
|---|---|---|---|
| **PT -> PC** | 5.348 | 0.000 | H1 is supported |
| **PC -> DC** | 3.659 | 0.000 | H2 is supported |
| **PC -> SMOS** | 3.823 | 0.000 | H3 is supported |
| **PC -> CC** | 3.905 | 0.000 | H4 is supported |
| **PC -> IICS** | 4.39 | 0.000 | H5 is supported |
| **PC -> SS** | 3.727 | 0.000 | H6 is supported |

Source: Authors' analysis with SmartPLS software

*3.2.3 Testing mediating effect*

- Bootstrap of the indirect effect

We continued our investigation by testing mediation via indirect effects in PLS-SEM. PC has a mediating role in transmitting the effect from PT to the dependent constructs (hypotheses H2'- H6').

(1) H2'. Participation in training (PT) indirectly influences high digital competencies (DC).
(2) H3'. Participation in training (PT) indirectly influences high self-management and organising skills (SMOS).
(3) H4'. Participation in training (PT) indirectly influences high collaboration competencies (CC)..
(4) H5'. Participation in training (PT) indirectly influences high interpersonal, intercultural and communication skills (IICS).
(5) H6'. Participation in training (PT) indirectly influences highly specific skills for remote teaching (SS).

P values (Table 8) and confidence interval (Table 9) are determined. P values remain less than 0.05 and T statistic over 2.00.

**Table 8. P values and T statistics**

| | P values | T statistics | Remark |
|---|---|---|---|
| H2': PT -> PC -> DC | 0.02 | 2.313 | H2' is supported |
| H3': PT -> PC -> SMOS | 0.021 | 2.394 | H3' is supported |
| H4': PT -> PC -> CC | 0.017 | 2.394 | H4' is supported |
| H5': PT -> PC -> IICS | 0.013 | 2.477 | H5' is supported |
| H6': PT -> PC -> SS | 0.022 | 2.294 | H6' is supported |

Source: Authors' analysis with SmartPLS software

- Bootstrapped confidence interval

The confidence interval measures how well the sample data represents the studied population. Using bootstrapping in SmartPLS we have determined the 95% confidence interval with the lower

(2.50%) and upper limit (97.50%) listed in Table 9. The hypotheses can be tested in PL-SEM with P values, but also with confidence intervals. According to Henseler (2018), if the value 0 (zero) does not fall within this interval, the hypothesis is accepted, otherwise it is rejected.

**Table 9. Confidence interval**

| | Original sample (O) | Sample mean (M) | 2.50% | 97.50% |
|---|---|---|---|---|
| PT -> PC -> SMOS | 0.075 | 0.082 | 0.029 | 0.153 |
| PT -> PC -> CC | 0.074 | 0.079 | 0.028 | 0.146 |
| PT -> PC -> SS | 0.072 | 0.078 | 0.025 | 0.147 |
| PT -> PC -> DC | 0.068 | 0.076 | 0.028 | 0.14 |
| PT -> PC -> IICS | 0.079 | 0.084 | 0.031 | 0.152 |

Source: Authors' analysis with SmartPLS software

After studying the relevant literature and best practices of remote work from various institutions, we have identified the main necessary skills for remote educators. These skills include digital competencies, self-management and organization skills, collaboration competencies, interpersonal, intercultural and communication skills, and specific skills for remote teaching.

All of these skills have been integrated under the paramount term of professional competencies, and their improvement can be achieved after participating in an upskilling training program.

## 4. Conclusions and further research

The research highlights the essential need for upskilling and continuous training for remote educators in the evolving digital landscape. The study established a robust research model with strong reliability, validity, and predictive relevance. Professional competencies were found to play a vital mediating role, influencing various critical skills for remote teaching and management. The model demonstrated a good fit and strong statistical significance in its relationships. This research shows the significance of investing in training and upskilling programs to enhance the competencies necessary for remote work, ultimately fostering success in the online environment. Further research is required regarding the effectiveness of the identified skills.

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