The Digitalization of Teaching Practices in K-12 Education: Insights from Teachers' Perspective

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Abstract. The reopening of schools and the returning to normal after the emergency experience of online teaching brought to the line new realities in educational practice for both teachers and students. It is now crucial to reflect on the consequences of this experience and rethink the prospects of using digital tools and online learning. The previous remote learning experience could be conceived as an opportunity for the educational community to take advantage of the benefits online teaching offers and adopt those practices that could further develop the teaching experience. This paper examines the reality in K-12 schools after the pandemic investigating the incorporation of seven digital teaching strategies into teachers' daily routines. The study adopts a mixed methodology approach analysing quantitative data from an online survey of 392 in-service teachers and qualitative data from two focus groups. The results show that an essential percentage of teachers continue to use some practices of the distance learning model to enhance learning and communication in the classroom. The use of these strategies was directly and indirectly affected by teachers' attitudes towards the distance learning model and their perceptions of the challenges faced during the pandemic. Implications for policy and practice are drawn.

Keywords: Digital teaching strategies · Distance learning model · Post COVID-19 era · Online teaching · K-12 education · Teachers

1 Introduction

There is much discussion about how COVID-19 is changing many areas of our lives and education landscape. After more than two years of the pandemic, the investigation on what are the long-term and permanent effects on teaching and learning has been set off. Terms such as online education, distance learning, or education information technology are no longer extraneous to school communities. Several authors noted that education

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would never be the same after COVID-19 [1–3]. However, the extent to which education is now digitally transformed remains a question.

The disease outbreak in Cyprus started in March 2020, when the government imposed the first national lockdown for around three months. As in most countries worldwide, local primary and secondary education schools shifted to a new reality from one day to another. The distance learning model vastly replaced the conventional physical attendance in schools, gradually forming the new regular education. Teachers strived to employ digital methods and practices by integrating technology and available digital tools to maintain the educational process. Although this transition was imposed by the circumstances of that period, it is still unclear whether teachers continue to employ such practices in the post-COVID-19 era as long-term effects of the pandemic.

This study aims to investigate whether K-12 education in Cyprus changed after the pandemic regarding the teaching practices and methods adopted by the teachers. As a further investigation, we explore the influence of two factors related to the attitudes and perceptions of teachers on the adoption of digital teaching strategies in the classrooms after the lockdowns. This study serves as an evidence-based effort offering some critical considerations regarding the effects of the distance learning model applied during the pandemic and contributing to the discussion on rethinking education in the post-COVID-19 era.

Despite the initial research conducted, no academic work focuses exclusively on the impact of COVID-19 on the digitalization of teaching practices in K-12 education in Cyprus. This research highlights critical insights from the teachers' perspective regarding using online practices in the classroom. Based on teachers, those practices could further enhance the learning experience of both students and teachers, providing opportunities for collaboration, communication, and digital skills development. The examination focuses on seven practices as strategies to improve learning. Quantitative and qualitative data were collected through a parallel mixed-method design to address the research questions of this study:

1. Which digital teaching strategies are used in K-12 education in Cyprus after the pandemic of COVID-19, and to what extent? Which aspects comprise these digital teaching strategies?
2. Which factors affect the use of these digital teaching strategies after the pandemic, related to teachers' attitudes towards the distance learning model for K12 education and perceptions about the challenges faced during the pandemic? (see Fig. 1).

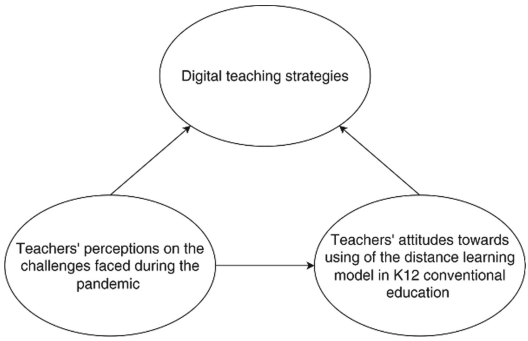

Fig. 1. The hypothesized model on the direct and indirect effects on the use of digital teaching strategies (research question 2)

2 Rethinking K-12 Education After COVID-19

Indisputably, the COVID-19 has caused an immeasurable global impact on more than 191 educational systems worldwide [4]. The national lockdowns had interrupted conventional schooling in response to the virus contagion. They forced institutions to switch to a 100% online modality, making remote learning the de facto method of education provision for varying periods [5, 6]. The immersive effects have demanded urgent attention and solutions to address the difficulties and limitations associated with the rapid adoption of digital technologies and the transformation of educational infrastructures.

Studies conducted around the world reached some common conclusions regarding the impact of COVID-19 on education regarding digital teaching practices and strategies; teachers are compelled to make concerted efforts to develop creative approaches to online teaching that they might not have prepared for in the past. This was attempted by exploiting existing infrastructures or designing new pedagogical delivery concepts. However, new methodologies required specific preparation time and familiarisation with devices and platforms. Teachers would also collaborate with colleagues and teaching staff to exchange ideas and support each other [7–10].

The crisis stimulated innovative approaches and teaching methodologies incorporating digital tools during teachers' daily practice [11]. Digital-driven education innovations can now be spotted everywhere, generating a "trend" in schools and classrooms [12]. For example, teachers would monitor and assess students' performance through quizzes and rubric-based assessment tools, although they face great difficulties monitoring and verifying students' learning [6, 12].

The mass response by governments to support the education systems for implementing online learning solutions worldwide would possibly lead to new foundations for transforming schools based on the demands of high digitalized societies [4]. The use of digital tools and platforms were explored as valuable opportunities that came to stay in education even when face-to-face teaching resumes [12]. This mass swift has shown that the potential to transform the future of learning is possible, provided that systems are appropriately supported, and technology is leveraged to complement a skilled teaching staff [10].

2.1 Challenges and Boundaries for Change

When designed and implemented deliberately, online learning might offer equal benefits as conventional face-to-face schooling. However, emergency remote teaching due to COVID-19 was far from that [13]. Still, effective and meaningful online learning can be pursued if teachers have adequate time to plan and realize the full scope of using digital tools and platforms [14]. Affordability and acquisition of appropriate digital devices, availability of good quality internet, suitability of working conditions at schools and houses, and catering for the unique needs of students are only some of the factors that should be strategically addressed in basic education's online learning. Moreover, teachers' and students' lack of digital education recourses and low digital literacy were among the main boundaries reported for a smooth transition [9, 15]. However, neither the time nor the resources were adequate for such preparation. At the same time, social isolation and emotional and psychological distress over adjusting to the new reality imposed further challenges to distance learning [12, 16, 17]. Considering these factors, the COVID-19 has undoubtedly highlighted the inadequacies and inequalities in the education systems.

Results from European studies varied in the outcomes of applying online learning during the pandemic. For example, Kruszewska and her colleagues [7] found that despite the vast experience teachers could gain from engaging in remote education, they did encounter numerable issues that hindered their efforts to teach online. These includes the absence of information technology equipment in students' homes, lack of communication and motivation among students, and decreased learning efficiency. Similarly, a research in Finland [18] showed that while some teachers indicated remarkable resilience and capacity to respond to the challenge of digitalizing their practices, others have struggled, as it required the integration of digital tools efficiently and in a way that benefits students' performance. Lavonen and Salmela-Aro [19] identified that teachers suffered from stress, weakening the learning conditions.

The switch to more digitalized solutions to learning has motivated institutions to become more accepting of the use of modern technologies [20]. Empirical evidence suggests that teachers' intention to use online learning is highly correlated with their readiness to incorporate such methods into their practices, prior experience and ICT skills [21]. At the same time, students' attitudes toward using computers, their self-efficacy to browse the internet for educational purposes, and teachers' positive attitudes toward e-learning were significant factors contributing to their motivation for learning [17]. Online learning has also imposed more freedom and flexibility on physically challenged students, who can participate in learning through virtual environments, thus limiting movement requirements [12]. As a result, suitable pedagogies for online education depend on teachers' expertise and exposure to ICT tools for communication, collaboration, and content creation. Therefore, the extent to which schools and society adapt efficiently to online teaching is highly debatable when speaking in the long term.

2.2 The Case of Cyprus

Cyprus has not been an exception for transitioning to online education. In-school operation of all public and private schools in the country was suspended in March 2020, when

the first national lockdown was imposed, recalling all institutions to act for synchronous and asynchronous distance learning [22].

During the pandemic, most teachers used Microsoft Teams (as suggested by the Ministry of Education) as their preferred platform to communicate with students and deliver teaching, in addition to the use of email, Facebook (Messenger) and ZOOM [23]. Nevertheless, as in many other countries worldwide, many teachers in Cyprus working in public schools struggled to shift their daily teaching practices into online modes, as they did not have adequate prior experience using online tools. Therefore, they had to receive specific training and overcome various technical and pedagogical challenges to establish an efficient online learning process. In contrast, private schools proved to be much more prepared to cope with such requirements, with students having fewer issues accessing ICT and internet connections [24, 25].

3 Methods

3.1 Sampling Process and Participants

A parallel mixed-method design was used to obtain data for this study [26, 27]. Data collection took place in June-July during the summer after the school year 2020–2021. The subjects of this study are teachers of K-12 education in Cyprus.

An online questionnaire was administered electronically through an official announcement[1] of the Cyprus Pedagogical Institute to all country's primary and secondary schools. Data were collected as a part of a larger survey on teachers' best practices, challenges and recommendations about the distance learning model applied during COVID-19 in Cyprus. The questionnaire was developed by the CARDET research team, who have long experience in educational technology topics and approved by the Cyprus Pedagogical Institute. A total of 411 teachers filled in the online questionnaire administered in the Greek language. Pre-primary education teachers (n = 19) were excluded from this study as they consist of a very small and not relevant cluster for this study. Consequently, the sample consists of 392 teachers (24.7% male, 75.0% female, 0.3% other). Most of the participants work in public schools (n = 349, 89.0%), while the rest in private schools (n = 43, 11.0%). Around half of them are teachers in primary education schools (i.e., grades 1–6; n = 207, 52.8%) and the other half work in secondary education schools (i.e., grades 6–12; n = 185, 47.2%). From the latter group, 73 teachers are employed in lower secondary schools (i.e. grades 7–9), 90 in upper secondary schools (i.e., grades 10–12), and 22 in technical schools. The participants held either a master's degree (n = 246, 62.8%), a bachelor's degree (n = 116, 29.6%), or a doctoral degree (n = 30, 7.7%). The sample is reliable at 95% (Confident interval [CI] = .05) of the total population of teachers in Cyprus, which is 10,863 for the year 2019–2020, according to the latest data from the National Statistical Service [28].

Two focus groups were conducted in parallel with the questionnaire distribution, based on a semi-structured guide, which provided the qualitative data of this study. Eight primary school teachers formed the first group, and six teachers comprised the group of secondary education. The conversations were recorded, transcribed, and content analysed [29].

[1] The official announcement of the Cyprus Pedagogical Institute can be accessed here.

3.2 Measures

Digital Teaching Strategies. The use of seven digital teaching strategies by teachers after the pandemic, along with the conventional teaching in the classroom, was answered on a scale from 1 (Every day) to 5 (Never). The items emerged during a preliminary analysis of how COVID-19 changed teaching in Cyprus. During this process, the research team consulted the Cyprus Pedagogical Institute, which was continuously communicating with the schools during the 3-month lockdown (i.e. May-June 2020). Examples of digital teaching strategies provided are "Use of the digital classroom in combination with the conventional classroom", "Create online activities for student collaboration", or "Provide personalised supportive teaching to students through technology (e.g. MS Teams, chat)". Further analysis of the properties of this scale is presented in the section on results, as the investigation of this measure falls under the first research question.

Teachers' Attitudes and Perceptions. Two items were used to observe the attitudes of teachers towards the distance learning model for K-12 education: "If properly designed, the distance learning model can bring just as good results as the conventional teaching" and "I want to continue to use the distance learning model in combination with conventional teaching (blended learning)". The items were answered on a Likert scale ranging from 1 (Totally disagree) to 5 (Totally agree). With the later item, we refer to combining online learning with face-to-face class time as supplementary, which is used to build upon the content discussed in the classroom. Other studies provided evidence that this learning modality can benefit students as they can independently review the course and interact with the online material at their own pace, which may result in better performance, higher motivation and lower anxiety [30]. The reliability of the factor representing teachers' attitudes towards applying the distance learning model in K-12 conventional education was measured using the Spearman's Rho coefficient and estimated at .408 ($p > .01$), which indicates a significant correlation [31].

Last, teachers' perceptions of the challenges faced during the pandemic were captured through a scale addressing four main issues: the additional time required to prepare a distance learning lesson, the lack of educational material in digital formats, the lack of interaction with students, and the physical, mental and emotional exhaustion of students and themselves. A higher score on the scale indicates that the challenge was more important for the teacher (1 = Not important, 3 = Very important). Cronbach's alpha for this latent scale was satisfactory ($\alpha = .66$). Confirmatory factor analysis (CFA) was conducted for both measures added in the same model to examine their relationship and test if these measures are consistent with the researchers' understanding of the nature of the construct. Model's properties were assessed using the maximum likelihood method: chi-square test, Comparative Fit Index (CFI > 0.95), Root Mean Square Error of Approximation (RMSEA < 0.05), Standardized Root Mean Square Residual (SRMR ≤ 0.05), and 90% Confidence Interval of RMSEA < 0.08. Results indicated a good model fit, $\chi^2(7) = 15.08$, $p < .05$; CFI = 0.98; RMSEA = 0.05, 90% CI [0.01; 0.09], SRMR = 0.03, after a minor correction on the distribution of standardized residuals. Factor loadings were .55 and .75 for teachers' attitudes and ranged from .39 to .77 for teachers' perceptions of challenges ($p < .05$). The correlation between the two factors was estimated at −.381 ($p < .05$). Based on these results, the structural model, including both latent variables, was evaluated as acceptable for use in the following analyses.

3.3 Data Analysis

As per the parallel mixed-method design, qualitative and quantitative data were collected in the same phase of the research, analysed separately, and discussed together [27]. First, the two focus groups were scrutinised using content analysis to identify patterns and new themes. Second, apart from the factor analysis to assess the psychometric properties of each scale, we used Structural Equation Modelling (SEM) [32] to estimate the direct and indirect effects of attitudes and perception on the use of digital teaching strategies (see research question 2). Analyses were conducted using SPSS v.20.0.0 and EQS 6.4 software [33]. Last, the qualitative data were used to confirm or complement the quantitative results and triangulate our findings.

4 Results

4.1 Quantitative Results

The analysis of the seven given digital teaching strategies in K-12 education in Cyprus showed that teachers barely tended to do so in their daily practice. The mean of all items was well above the average (from 3.18 to 4.18), indicating that they employ these strategies weekly or monthly. The most usual strategy identified deals with their professional practice (i.e., use of technology to communicate with colleagues) rather than directly involving technology in the classroom ($M = 3.18$, $SD = 1.36$). The assignment of tasks via MS Teams or other tools and the combination of digital and conventional classrooms were two strategies applied at least monthly. Less frequently, teachers created online activities for student collaboration (see Table 1).

Correlation and comparable analysis (Pearson correlation and t-test for independent samples) followed to identify whether any digital teaching strategy is related to teachers' characteristics (i.e., gender, age, educational attainment level, years of experience, education level employed). The results revealed no significant relationships or differences (male vs female), apart from the case educational level used (primary vs secondary). The t-test showed statistically significant differences in the means of seven items between the two groups. Teachers in secondary education schools frequently used the seven digital teaching strategies more than their colleagues in primary schools.

Since the scale was developed and administered for the first time, we ran an exploratory factor analysis (EFA) and then a confirmatory factor analysis (CFA) based on the results. The principal component analysis (PCA) with Varimax orthogonal rotation was used for the EFA. The KMO test was good, .829, and the analysis extracted two factors. The first factor represented the digital teaching strategies to enhance learning (5 items) and explained 36.48% of the total variance. Factor loadings ranged from .57 to .82. The second factor comprised the digital teaching strategies for communication (2 items) and explained 23.70% of the remaining variance (total variance explained 60.19%). Factor loadings were .88 and .65. Factors' reliabilities were .78 (Cronbach's alpha) and .35 (Spearman's rho), respectively (see Table 2).

The two subscales were entered into one CFA model to evaluate their psychometric properties. Results indicated a good model fit, $\chi^2\ (12) = 36.38$, $p < .001$; $CFI = 0.96$; $RMSEA = 0.07$, 90% CI [0.05; 0.09], $SRMR = 0.04$, after a minor correction on the

Table 1. Frequency of use of seven digital teaching strategies

	Mean	SD
Use technology to communicate with colleagues (e.g., video conference)	3.18	1.36
Assign tasks via MS Teams (or other digital tools)	3.41	1.51
Use of the digital classroom in combination with the conventional	3.43	1.48
Use technology to communicate with parents/guardians (e.g. emails, etc.)	3.56	1.39
Create a space for asynchronous communication in the afternoon	3.70	1.42
Provide individualised supportive teaching to students through technology	3.78	1.29
Create online activities for student collaboration	4.18	1.21

Note. Items were listed on a scale where 1 = Every day, 2 = 2–3 times a week, 3 = Once a week, 4 = Sometimes a month, and 5 = Never. N = 392

Table 2. Factor loadings of items on the two factors extracted by varimax rotation

#		Factors*		h^2
		I	II	
q01	Use of the digital classroom in combination with the conventional classroom	**.82**	−.17	.69
q02	Create a space for asynchronous communication	**.73**	.16	.64
q03	Assign tasks via MS Teams (or other digital tools)	**.69**	.38	.55
q04	Create online activities for student collaboration	**.63**	.26	.48
q05	Provide individualised supportive teaching	**.57**	.43	.54
q06	Use technology to communicate with parents/guardians (e.g. emails, MS Teams)	−.03	**.88**	.78
q07	Use technology to communicate with colleagues	.37	**.65**	.57
	Eigenvalues	3.09	1.13	
	Percentage of variance	36.48	23.70	
	Cumulative percentage of variance	36.48	60.19	

Note.
*__Factor I:__ Digital teaching strategies to enhance learning
__Factor II:__ Digital teaching strategies for communication

distribution of standardized residuals. Factor loadings ranged from .52 to .78 for digital teaching strategies to enhance learning and were .47 and .80 for digital teaching strategies for communication ($p < .05$). The correlation between the two subscales was estimated at .692 ($p < .05$). These evaluation indices confirmed the measurement fit of all items and the structural fit between the latent variables as emerged from the EFA; therefore, the two-factor model was allowed for use to form the hypothesised model.

The structural analyses were conducted in four phases regarding the second research question. First, the factor of teachers' attitudes was regressed on the two subscales of digital teaching strategies. The exact process followed with the teachers' perceptions as the independent variable. Then, a model was constructed to observe if teachers' perceptions affect teachers' attitudes. Last, the factors were incorporated into one structure to form the hypothesised model. However, after the analysis preceded the digital teaching strategies (research question 1), the hypothesised model emerged (see Fig. 2).

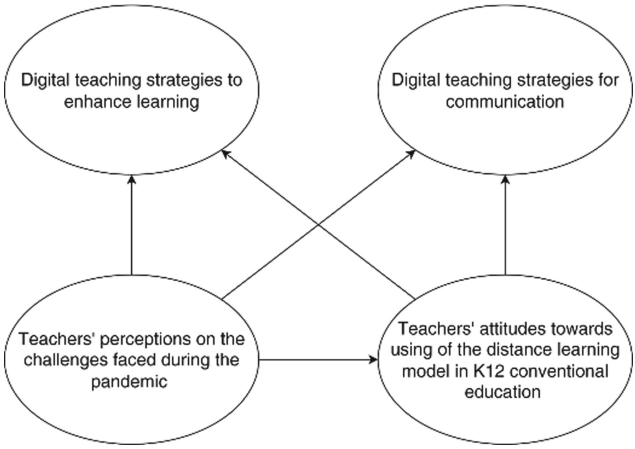

Fig. 2. The emerged hypothesised model on the direct & indirect effects of the use of digital teaching strategies

The regression analysis of teachers' perceptions of digital teaching strategies to enhance learning showed no statistically significant effect. Similarly, the effect on digital teaching strategies for communication was very low (i.e., −.07). The model did not show a good fit either. Thus, these effects were excluded from the final model. The regression of teachers' attitudes on the same subscales showed low to moderate negative effects on digital teaching strategies (−.385 on digital teaching strategies to enhance learning and −.256 on digital teaching strategies for communication). The analysis of the two independent factors revealed that teachers' perceptions of the challenges faced during the pandemic have a negative effect (−.381) on their attitudes towards using the distance learning model after the pandemic. Based on these results, we structured the final model (Fig. 3). Model fit was good, χ^2 (52) = 131.97, $p < .001$; CFI = 0.93; RMSEA = 0.06, 90% CI [0.05; 0.08], SRMR = 0.06. Teachers' attitudes were found to negatively affect teachers' perceptions (−.350, $p < .05$), meaning that those who considered the challenges during the pandemic less important expressed more positive attitudes towards adopting the distance learning model along with the conventional classroom. Therefore, teachers' perceptions of challenges only indirectly affected digital teaching strategies through teachers' attitudes towards the distance learning model. The direct effect of teachers' attitudes on digital teaching strategies to enhance learning and communication was estimated at −.402 and −.251 correspondingly (at $p < .05$). These effects indicate

that positive attitudes toward the distance learning model foresee more frequent use of the digital teaching strategies.

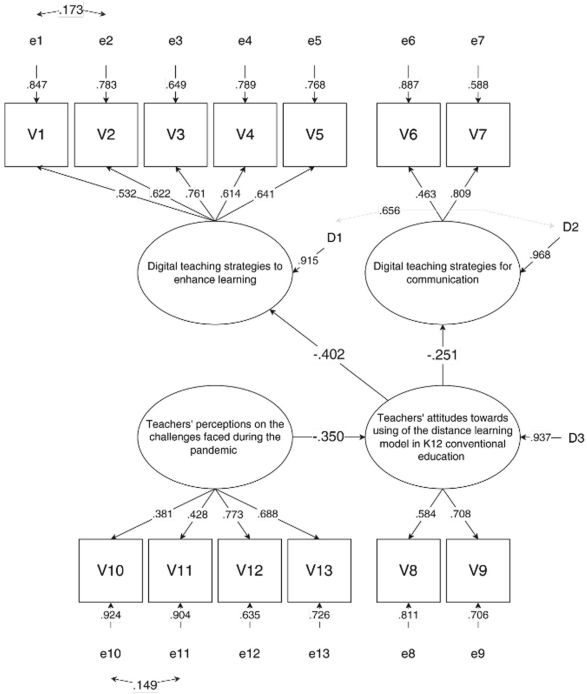

Fig. 3. The final model and estimated direct and indirect effects on the use of digital teaching strategies. Note. All effects are statistically significant at $p < .05$.

4.2 Qualitative Results

The data from the focus groups led to the triangulation of the above findings, as emerged from the qualitative analysis. During the focus groups, teachers were asked to provide their opinion if the distance learning model was used or could be exploited after the pandemic as a step toward a blended K-12 education. Responses were informative beyond the quantitative results, revealing further insights on why teachers continued using digital teaching strategies after the pandemic or not.

In secondary education, the attitudes towards the blended learning model were more optimistic than those in primary education: "*We uploaded many lessons online, so they are now there. If structured better, we can use them in the future and next year*". A teacher said, "*I would demand it to dedicate one day of the week for distance learning*". On the other hand, the hybrid model was, in many cases, imposed by the circumstances because some students in the classrooms needed to stay home to stop the chain of contamination. Primary education teachers found coping with the hybrid model challenging. A teacher explains, "*I had to react very fast in everything. In the beginning, I allowed children to*

interact [with those at home] to make the lesson more engaging and interactive. However, I soon had to interrupt them and choose the student to talk to. Good organisation and time management were required."

Several digital tools were used in classrooms as a 'heritage' from the pandemic era. A primary education teacher said, "*We used some tools such as Kahoot and Padlet because we have already learned them. […] Also, something I saw that worked well was chatting communities and online spaces for communication and for students to upload their assignments*". In secondary education, teachers also mentioned several digital tools; "*I used MS Teams for communication as a group chat and OneNote. I told them [students] now you know how to use your online notebook, assignments will be done and corrected there.*" Similar practices were adopted by secondary teachers, such as "*worksheets and exercises for homework were uploaded in MS Teams*".

As observed in the quantitative results, teachers used digital means for communication with colleagues; "*As a school principal, I did not teach to classrooms, but I used MS Teams for teleconferences with my school staff*". In secondary education, teachers mentioned that "*we met several times with colleagues during afternoons and days off to discuss several things*". Others added that online meetings are a handful in cases where teachers live in different towns with other schools and attend the seminars.

In summary, teachers' experience with the distance learning model opened new approaches to teaching. They appeared confident to discuss the possibilities of integrating new tools and practices in their daily practice, if not new teaching models. However, several limitations exist that do not allow a complete transition even if desired and accepted by the education stakeholders, including themselves, as evidenced by the quantitative analyses. How they experienced those limitations appears to be decisive in their attitudes and integration of digital tools into their daily practice.

5 Discussion

Our study falls under the global discourse to explore whether the urgent need for continuing schooling and the adoption of online methods and tools to achieve remote education due to the COVID-19 pandemic turned over a new leaf for K-12 education, as questioned by more researchers [34]. Nevertheless, looking at the bigger picture, with technology integration in education, schools are no longer seen as classrooms in the traditional sense where knowledge is merely imparted upon students [15]. According to the literature, there is no one-size-fits-all pedagogy for online learning; it is dependent upon factors such as the subject under study, such as the adequate provision of training or technical infrastructure to enable the incorporation of digital tools [12]. The question that arises, therefore, is the extent to which this new reality could redefine education and reimagine it beyond the inflexible and outdated models that most systems continue to apply today.

In this article, we examine the use of seven digital teaching strategies after the pandemic in K-12 education in Cyprus. Factors related to teachers' attitudes toward the distance learning model and teachers' perceptions of the challenges faced during the pandemic were selected to examine their effect on the use of digital teaching strategies. Our results reveal that K-12 education teachers in Cyprus now use digital teaching practices for communication, task assignment and digital classroom management.

Secondary teachers adopted digital teaching practices to a greater extent than primary teachers to provide educational opportunities to all students. As argued during the interviews, secondary education teachers found it easier to adopt digital strategies because their students appear familiar and competent with technology. On the contrary, primary education teachers should contact parents or guardians instead of reaching out to their students, as essential guidance and support from an adult are required during distance learning. However, the presence of an adult was not always feasible in many cases. This fact generates important implications for integrating certain digital practices based on students' education level.

The structural equation analyses revealed that teachers' positive attitudes towards the distance learning model foresee a more frequent use of the referred digital teaching strategies. This effect was more substantial on the digital teaching strategies to enhance learning than strategies for communication. Teachers' perceptions of challenges during the pandemic had a moderate negative impact on these attitudes. This highlights that perceived limitations and deficiencies of the distance learning experience during lockdowns influenced whether teachers are willing to adopt a digitally-friendly approach. This is important for policymakers and school leaders to consider. Should conventional teaching continue to be supported using online methods, it is necessary to invest in teachers' professional development and real-time guidance to overcome the pandemic upset. Considering the benefits of technology-enhanced learning, the digital transformation of education should be a core concern among governments, seeking ways to empower teachers and schools to act as leaders in the digitalisation of classrooms [18].

The global crisis has shown us the lucrative side of online teaching and learning and the benefits of sermonizing teachers and students at any time, in any part of the world, destroying any barriers that conventional methods could not [20]. Online teaching could be equally creative, innovative, and interactive as traditional modes to attract students' attention and facilitate knowledge. There are undoubtedly gaps in remote learning, yet, it has a great potential to continue as part of the teaching process if appropriately designed. Taking all into consideration, important questions arise regarding the role of distance education in reshaping digitalization after the pandemic. The policymakers' role is crucial in addressing those for a holistic integration of digital strategies into the teaching reality.

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References

1. Kalantzis, M., Cope, B.: After the COVID-19 crisis: why higher education may (and perhaps should) never be the same. ACCESS: Contemp. Issues Educ. **40**(1), 51–55 (2020)
2. Riley, N.S.: K-12 Education Will Never Be the Same After Covid-19. Bloomberg Opinion, N.PAG. (2021). Accessed 14 Apr 2022
3. Yarrison, B.G.: "To seek a newer world": honors in virtual reality. Honors Pract. **17**, 185–194 (2021)

4. United Nations: Policy Brief: Education during COVID-19 and beyond (2020). https://www.un.org/development/desa/dspd/wp-content/uploads/sites/22/2020/08/sg_policy_brief_covid-19_and_education_august_2020.pdf. Accessed 14 Apr 2022
5. Yu, L.: Analysis and enlightenment of user agreements based on the three smart teaching tools of rain classroom. Manag. Sci. Eng. **14**(1) (2020)
6. Almonacid-Fierro, A., Vargas-Vitoria, R., de Carvalho, R.S., Fierro, M.A.: Impact on teaching in times of COVID-19 pandemic: a qualitative study. Int. J. Eval. Res. Educ. (IJERE) **10**(2), 432 (2021)
7. Kruszewska, A., Nazaruk, S., Szewczyk, K.: Polish teachers of early education in the face of distance learning during the COVID-19 pandemic – the difficulties experienced and suggestions for the future. Education 3–13 **50**(3), 304–315 (2020)
8. Meinck, S., Fraillon, J., Strietholt, R.: The impact of the COVID-19 pandemic on education international evidence from the responses to educational disruption survey (2022)
9. Schleicher, A.: The Impact of Covid-19 on Education Insights from Education at a Glance (2020)
10. The World Bank, UNESCO and UNICEF: The State of the Global Education Crisis: A Path to Recovery. The World Bank, Washington D.C. (2021)
11. Dwivedi, Y.K., et al.: Impact of COVID-19 pandemic on information management research and practice: transforming education, work and life. Int. J. Inf. Manag. **55**, 102211 (2020)
12. Pokhrel, S., Chhetri, R.: A literature review on impact of COVID-19 pandemic on teaching and learning. High. Educ. Future **8**(1), 133–141 (2021)
13. Hodges, C., Moore, S., Lockee, B., Trust, T., Bond, A.: The Difference Between Emergency Remote Teaching and Online Learning (2020)
14. Di Pietro, G., Biagi, G., Costa, P., Karpiński, Z., Mazza, J.: The likely impact of COVID-19 on education: reflections based on the existing literature and recent international datasets. Publications Office of the European Union, Luxembourg (2020)
15. Cheng, X., Pellegrini, M., Zhou, L., Cheung, A.C.K.: Not only survival but stronger: the impact of alarming invader of SARS-CoV-2 on global education. Sci. Insights Educ. Front. **7**(2), 835–860 (2020)
16. Dias, A., Scavarda, A., Silveira, H., Scavarda, L.F., Kondamareddy, K.K.: The online education system: COVID-19 demands, trends, implications, challenges, lessons, insights, opportunities, outlooks, and directions in the work from home. Sustainability **13**(21), 12197 (2021)
17. Wang, X.Y., Li, G., Malik, S., Anwar, A.: Impact of COVID-19 on achieving the goal of sustainable development: E-learning and educational productivity. Econ. Res.-Ekonomska Istraživanja 1–17 (2021)
18. Iivari, N., Sharma, S., Ventä-Olkkonen, L.: Digital transformation of everyday life – how COVID-19 pandemic transformed the basic education of the young generation and why information management research should care? Int. J. Inf. Manag. **55**, 102183 (2020)
19. Lavonen, J., Salmela-Aro, K.: Experiences of moving quickly to distance teaching and learning at all levels of education in Finland. In: Reimers, F.M. (ed.) Primary and Secondary Education During Covid-19, pp. 105–123. Springer, Cham (2022). https://doi.org/10.1007/978-3-030-81500-4_4
20. Dhawan, S.: Online learning: a panacea in the time of COVID-19 crisis. J. Educ. Technol. Syst. **49**(1), 5–22 (2020)
21. Ngabiyanto, Nurkhin, A., Widiyanto, Saputro, I.H., Kholid, A.M.: Teacher's intention to use online learning; an extended technology acceptance model (TAM) investigation. In: Journal of Physics: Conference Series, vol. 1783, no. 1, p. 012123 (2021)
22. CEDEFOP: Cyprus: Responses to the Covid-19 outbreak. CEDEFOP (2020). Accessed 10 Apr 2022

23. Vrasidas, C., Kosmas, P., Nisiforou, E., Michael, D.: The Implementation of Distance Education in Cyprus Schools. CARDET Press (2020)
24. Nisiforou, E.A., Kosmas, P., Vrasidas, C.: Emergency remote teaching during COVID-19 pandemic: lessons learned from Cyprus. EMI **58**(2), 215–221 (2021)
25. Sofianidis, A., Meletiou-Mavrotheris, M., Konstantinou, P., Stylianidou, N., Katzis, K.: Let Students Talk about Emergency Remote Teaching Experience: Secondary Students' Perceptions on Their Experience During the COVID-19 Pandemic (2021)
26. Cohen, L., Manion, L., Morrison, K.: Planning educational research. In: Research Methods in Education. Routledge Editors, New York (2011)
27. Creswell, J.W., Plano Clark, V.L.: Designing and Conducting Mixed Methods Research, 2nd edn. SAGE Publications (2011)
28. Statistical Service of Cyprus (2021). https://library.cystat.gov.cy/Documents/Publication/ABSTRACT-2019-EN-270521.pdf
29. Chi, M.T.: Quantifying qualitative analyses of verbal data: a practical guide. J. Learn. Sci. **6**(3), 271–315 (1997)
30. Poon, J.: Blended learning: an institutional approach for enhancing students' learning experiences. J. Online Learn. Teach. **9**(2), 271–289 (2013)
31. Eisinga, R., Grotenhuis, M.T., Pelzer, B.: The reliability of a two-item scale: Pearson, Cronbach, or Spearman-Brown? Int. J. Public Health **58**(4), 637–642 (2012)
32. Kline, R.B.: Principles and Practice of Structural Equation Modeling, 4th edn. Guilford Press (2015)
33. Bentler, P.M.: EQS 6, Structural Equations Program Manual. Multivariate Software Inc., Encino (2006)
34. Zhao, Y., Watterston, J.: The changes we need: education post COVID-19. J. Educ. Change **22**(1), 3–12 (2021). https://doi.org/10.1007/s10833-021-09417-3