

# Digital Competences for Teachers in Virtual Environments COVID-19

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## Abstract

This study aims to establish the relationship between instrumental digital competencies and virtual education in times of covid-19. Its approach is quantitative, descriptive, correlational, and cross-sectional. The population consisted of 5940 students from 7 faculties of a public university in Lima and Valle, distributed in 53 study programs of the 2021-I academic cycle. A representative probability sample of 360 was established. It was found that there is a significant relationship between instrumental digital competencies and virtual education in times of covid-19. (With a  $p < 0.05$ ) finding a Spearman's Rho correlation = 0.778 considerable positive correlation.

## Keywords

Digital competencies, teacher, COVID-19, instrumental competences.

## 1. Introduction

Everyday education has had a significant turn and progress due to the pandemic, as it has generated a radical advance in the insertion of both teachers and students into the virtual modality. Within this context of uncertainty, we adapted to the development of classes through virtual platforms; however, this situation highlighted the gaps and the low level of development of teachers' digital competencies. As [1] comments in his research, the global health emergency had a worldwide impact on education, causing an abrupt change in the teaching methods of teachers, and revealing large gaps in digital competencies.

According to [2], digital competence is understood as the set of knowledge, skills, and attitudes that are required when we use digital technologies to perform a task, solve a problem, communicate, or create content in a critical, efficient, effective, or ethical way, whether for learning, work, leisure, or socialization, among other areas. As a result, digital competence has become very important, especially for teachers. This is corroborated by the study by [3], which indicates that, in the field of education, the pandemic generated by COVID-19 has revealed the existence of gaps, as inequalities have been identified in students and their families in access to technology and in teachers' competences to work in these new environments [4] and [5].

It is from this problem that it is necessary to carry out this study since the situation that arises when observing the digital competencies of the teaching population in times of virtual education due to the new coexistence by COVID-19 are perceived and evaluated by students in this new learning modality, which brings with it new ways of teaching for teachers and new ways of learning for learners [6] and [7]. Therefore, although there is consensus on raising the quality of training in higher education

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students, there is also consensus that teachers should acquire greater skills and abilities in the use of technologies and their applications to competently impart their training experiences to their students [8].

In this sense, it is necessary to know how the digital competencies inherent to teachers are related to the virtual education given to students in COVID-19 times, as well as to know whether this relationship is positive or negative. Therefore, this study aims to establish the relationship between instrumental digital competencies and virtual education in times of COVID-19.

Furthermore, this research aims to provide the scientific community with evidence that teachers' digital competencies can be measured and thus be of great importance for other studies, as well as to show that a low digital competence of teachers could be associated with low performance in their profession.

## 2. Methodology

The study was conducted under a quantitative approach of descriptive design for the description of each variable, correlational because it seeks theoretical, empirical, and statistical relationships between two variables, and cross-sectional because the application of the instrument is given to a given period of the reality in question.

The population consisted of 5940 students, corresponding to the 7 Faculties of the National University of Education Enrique Guzmán y Valle, distributed in 53 study programs, during the 2021-I academic cycle. A representative probability sample of 360 students was established with a 95% confidence level. Proportional allocation was performed to determine the number of respondents to be applied by major as shown in Table 1.

**Table 1**

National University of Education Enrique Guzmán y Valle (Faculties)	Students	
	Populations	Sample
Agriculture and Nutrition	384	25
Sciences	776	50
Administrative Sciences	604	39
Social Sciences and Humanities	1409	92
Initial Education	428	28
Pedagogy and Physical Culture	905	59
Technology	1034	67
Total	5540	360

Student population and sample 2021-I

The instruments used are two questionnaires. The first is the Questionnaire on teachers' digital competencies which consists of 28 items: 10 on instrumental digital competencies; 10 on didactic competencies and 8 on cognitive competencies; with five response alternatives: Never (1); Seldom (2); Sometimes (3) Almost always (4) Always (5) with a duration of 30 minutes for its application, which measures the students' perception of the teacher's digital competences.

The second is the Questionnaire on virtual education in times of covid-19 which consists of 20 items that are divided into four dimensions, which are the informative, practical, communicative, and tutorial dimension with 5 questions each with five response alternatives: Never (1); Rarely (2); Sometimes (3) Almost always (4) Always (5) with a duration of 20 minutes; it measures the perception of students about their virtual education in times of covid-19.

For the validation of both instruments, they were submitted to expert judgment and an excellent reliability was obtained according to the Cronbach's Alpha coefficient of the variable Instrument: Digital Capabilities of Teachers and Virtual Education in the covid-19 era, which yields reliability values of 0.923 and 0.906 close to 1.

### 3. Results and discussion

It is necessary to indicate that this research is a step forward in determining the relationship between digital teaching competencies and virtual education in times of covid-19. These results correspond to the dimension of instrumental digital competencies that aims to establish the relationship between instrumental digital competencies and virtual education in times of covid-19.

#### Descriptive analysis

These results corresponded to the items that measure instrumental digital competence, from which it was obtained that out of 360 students from all faculties, 58.3% (210) considered the teachers' instrumental digital competencies to be good, 25.0% (90) considered them to be fair, 8.3% (30) considered them to be efficient, and 8.3% (30) considered them to be deficient, as shown in Figure 1.

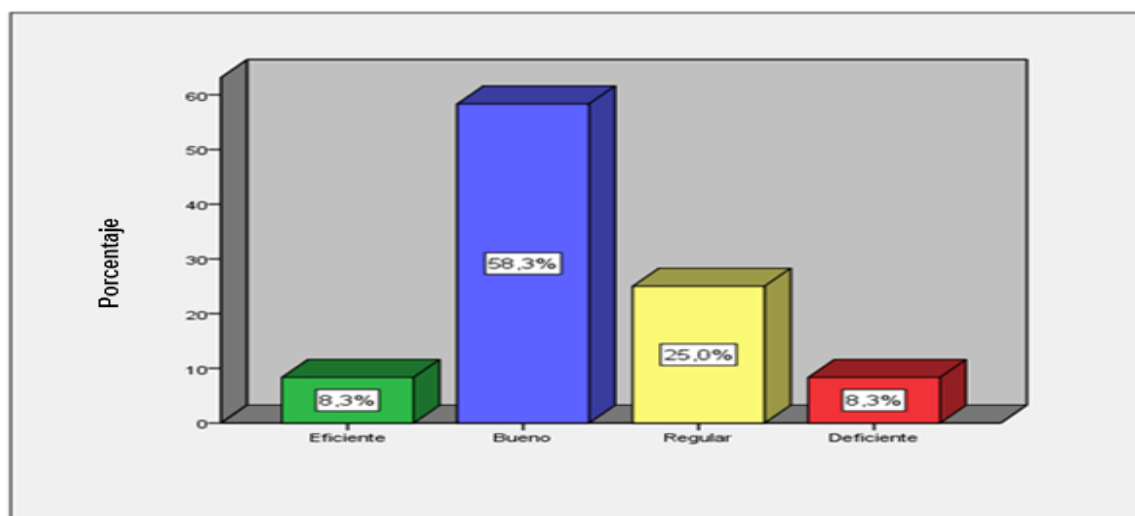


Figure 1: Dimension: Digital Enabling Skills

That is to say, 58% of the students have a perception that the teacher has demonstrated knowledge and use of the different information devices in virtual environments such as ICT resources, and educational software to search and recover and critical selection of information as mentioned by [9], the teacher has acquired skills to obtain and process relevant information using ICT so necessary to guide the student in their learning process in these new environments; This same affirmation is indicated by [10] and [11] in their study, teachers become guides, mediators, facilitators and motivators of meaningful and relevant learning processes.

However, 25% and 8.5% of the students have identified regular and deficient management; this has been determined because the items have reached a score in the levels and ranges that define them as deficient and regular. These results show that students perceive that their teachers do not have the necessary digital skills to develop their classes and guide their learning in these new digital environments, as mentioned by [12], there are still several gaps in teacher training that have not prepared them to adapt to the virtual world, which can be observed and at the same time does not allow the development of digital literacy of students, as well as the reflection that teachers must carry out on their teaching practice in digital environments [13]. All these studies are in line with the results of the research by [14], which identified that university teachers perceive themselves as having an intermediate level of digital competencies.

On the other hand, this same statement shows us that the development of these skills is urgent, as indicated by [15] and [16], it is necessary to improve teaching digital competence in the university context, since 8.3% of those surveyed mentioned that teachers have a deficient management of instrumental digital competence, this being the most operative in the management of ICT resources in the teaching-learning process.

The results of the second survey measuring virtual education in times of COVID-19 show that of the 360 students surveyed, 66.7% (240) consider the virtual education received in times of COVID-19

to be good, 25.0% (90) consider it to be average, 8.3% (30) consider it to be deficient, and 0.0% (0) consider it to be efficient.

These results show that the students perceive it as a positive alternative to continue with their studies through this modality imposed by the confinement. Therefore, as [17] mentions, a transformation of the university is necessary, as [18] indicates it is inevitable, highlighting the challenges concerning rethinking how this change affects the learning experience of all: students and faculty.

In order to test the hypothesis: There is a significant relationship between instrumental digital competencies and virtual education in times of covid-19, the determination of normality was applied using the Kolmogorov-Smirnov statistic. In addition, the level of risk or significance ( $\alpha$ ) was identified, which corresponds to:  $\alpha = 0.05$  in order to establish the degree of relationship between each of the variables under study: instrumental digital competencies and virtual education: for this purpose, the Chi-Square Correlation Coefficient, and Spearman's Rho were used.

The results obtained show that 50.0% of the students consider the teachers' instrumental digital competencies to be good, as well as the virtual education received in times of covid-19; this coincides with what was mentioned by [19] and [20], which indicate that in the face of the pandemic, students have valued continuing their academic life through this new modality; this coincides with what was mentioned with the results of [21] and [22], which indicate the need for all teachers to continue acquiring digital competences. However, it is observed that 16.7% consider it to be fair and 8.3% poor; in other words, the student's perception of this relationship is that teachers do not have sufficient digital skills for their teaching work; this is related to the study by [23] and [24] which indicate that students who are part of distance education programs have a better perception of these skills, as well as those teachers with more experience and a higher level of training. This coincides with [25] in mentioning that it recognizes the progress made by teachers, as an adaptation to the unforeseen change in online classes favored the development of teachers' digital competencies.

It was also identified that the level of instrumental digital competencies is directly related to virtual education in covid-19 times, i.e. the higher the level of teachers' instrumental digital competencies, the higher the level of virtual education received in covid-19 times; this coincides with [26] and [27] in that for teachers, the appropriate use of information and communication technologies (ICT) means the possibility of more agile, efficient and effective communication with students. Furthermore, according to Spearman's correlation of 0.778, this represents a considerable positive correlation; likewise, if we raise  $r^2$  we obtain the variance of common factors  $r^2 = 0.605$ , so there is a shared variance of 60.5%.

Consequently, it is verified that: There is a significant relationship between instrumental digital competencies and e-learning in times of covid-19.

#### **4. Conclusions**

It is concluded that there is a significant relationship between instrumental digital competencies and virtual education in times of covid-19 (with a  $p < 0.05$ ), finding a Spearman's Rho correlation = 0.778 and a considerable positive correlation.

In this sense, it has been established that the construction of this digital competence is linked to the requirements of remote education in times of the covid-19 pandemic, which requires the educator to develop instrumental skills, some of which they already possessed and others that they assimilated, for the teaching-learning of various subjects, for problem-solving, to think critically and creatively, and to communicate and collaborate with others.

Likewise, these skills have enabled educators to establish the management and achievement of a set of actions, such as the knowledge and use of different information devices (computers, printers, and other peripherals; the use of their reference programs and web pages at a functional and creative level; the use of standard educational software and reference websites; and the processing of information, search and retrieval of online data.

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