

Influence of the pedagogical use of Smartphone in rural Colombian schools in the Covid-19 Pandemic. Teachers' perceptions

Quintero Velandia Salomon

Universidad Norbert Wiener, Lima –Perú, aspirante a Doctor en educación; Rector en I.E Colombia. E-mail: salos119@gmail.com, ORCID: <https://orcid.org/0000-0002-3261-9663>

Villalobos Palacio Andrea

Universidad Norbert Wiener, Lima –Perú, aspirante a Doctor en educación; Docente oficial Colombia. E-mail: andreavillalobosp@gmail.com, ORCID: <https://orcid.org/0000-0001-9352-7052>

Yangali Vicente Judith Soledad

South American Center for Education and Reserch in Public Health, Universidad Norbert Wiener-Lima, Perú. E-mail: judith.yangali@uwiener.edu.pe ORCID <https://orcid.org/0000-0003-0302-5839>

Abstract

In the context of the pandemic caused by COVID-19, many countries had to close their schools at all academic levels and take distance education as the only alternative, using ICT tools that allow synchronous and asynchronous communication, as is the case of Smartphones. The present applied research, using the hypothetical deductive method, quantitative approach, a non-experimental correlational design, had as main objective to determine the influence of the pedagogical use of Smartphone in academic performance and virtual education in secondary and technical middle school, in rural educational institutions in the municipality of Toledo, department of Norte de Santander, Colombia, during the 2020 pandemic. This was carried out through the application of the survey technique to collect data using as an instrument a questionnaire of 24 questions in Likert scale, additionally the qualifications were taken in five

Key words:

Rural Schools,
Synchronous
Communication,
Asynchronous
Communication,
Smartphone, Academic
Performance, Virtual
Education



fundamental areas of the population that are 5 complete educational institutions of the municipality of Toledo, department Norte de Santander. The data were statistically processed using SPSS V25 software, allowing to observe the significant influence that the pedagogical use of the Smartphone has on academic performance and virtual education in rural educational institutions in the midst of the 2020 pandemic.

Influencia del uso pedagógico del Smartphone en las escuelas rurales colombianas en la Pandemia de Covid-19. Percepciones de los docentes

Palabras clave

Escuelas rurales,
Comunicación sincrónica,
Comunicación asincrónica,
Smartphone,
Rendimiento académico,
Educación virtual.

Resumen

En el contexto de la pandemia provocada por el COVID-19, muchos países tuvieron que cerrar sus escuelas en todos los niveles académicos y tomar como única alternativa la educación a distancia, utilizando herramientas TIC que permiten la comunicación sincrónica y asincrónica, como es el caso de los Smartphones. La presente investigación aplicada, utilizando el método hipotético deductivo, enfoque cuantitativo, un diseño correlacional no experimental, tuvo como objetivo principal determinar la influencia del uso pedagógico del Smartphone en el rendimiento académico y la educación virtual en la educación secundaria y media técnica, en instituciones educativas rurales del municipio de Toledo, departamento de Norte de Santander, Colombia, durante la pandemia del 2020. Se realizó mediante la aplicación de la técnica de encuesta para la recolección de datos utilizando como instrumento un cuestionario de 24 preguntas en escala Likert, adicionalmente se tomaron las calificaciones en cinco áreas fundamentales de la población que son 5 instituciones educativas completas del municipio de Toledo, departamento Norte de Santander. Los datos fueron procesados estadísticamente utilizando el software SPSS V25, permitiendo observar la influencia significativa que tiene el uso pedagógico del Smartphone en el rendimiento académico

y la educación virtual en las instituciones educativas rurales en medio de la pandemia del 2020.

1. Introduction

The massive use of Smartphone has intensified in recent years in all spheres of society, particularly by young people and children from a very early age, as well as in different urban and rural scenarios DANE (2018). Globally according to ITU (2018) there are more active cell phone lines than people, since for every 100 people there are 107 active cell phone lines and in some countries this ratio has increased significantly, as is the case of Colombia where there are 129.91 cell phone lines per 100 inhabitants and according to DANE (2018) in rural areas, although there are difficulties of connectivity and access the network 58.3% of people over 5 years old have a cell phone and mostly a Smartphone. It is here the concern that this device can be used pedagogically by teachers, children and young people, by integrating it into the curricula of the I.E. Briede et al. (2015), taking up what Siemens (2005) says in the theory of the connectivist approach where the use of these emerging technologies should be taken advantage of pedagogically.

This pedagogical proposal that gave rise to e-learning (Downs 2005) allowed improving traditional distance learning to the point that it actively integrated the student in the construction of their own learning; however the growing society and increasingly demanding tools that allow greater ubiquity and portability of learning found in mobile devices those alternatives that would allow a more continuous and adaptable learning not only to the mobility of people but as expressed by Kakihara and Sorensen (2002) three fundamental aspects of mobility should be integrated which are: temporal, spatial and contextual. It is then when the concept of the mobile-learning modality begins to gain spaces in the academic field giving rise to the learning modality called ubiquitous-learning or ubiquitous learning; this concept had already been studied and worked for several years Jones and Jo (2004), building personalized learning models adjusted to the needs of each student Paramythis and Loidl-Reisinger (2004) cited by Velandia-Mesa et al. (2017). However, in Colombia, situations of misuse of Smartphones and other mobile devices by

children and young people have been analyzed motivating to legislate in the prohibition of the use of Smartphones and other mobile devices at school by children and young people under 14 years old, when the reality is that more than 76% of young people between 12 and 17 years old have a Smartphone of their own and with mobile voice and data MinTIC (2015). This fact opened the national debate when the bill restricting the use in school of mobile devices was filed at the beginning of 2019 in Congress, finding support by some political sectors having as a reference the measures taken in France and rejection by some education academics, Semana, (2019). This debate was paused when the health emergency caused by the Covid-19 pandemic began, due to the fact that educational institutions had to be closed at all academic levels and in all places, taking as an alternative remote education from the homes of both teachers and students, according to UNESCO (2020a) more than 185 countries closed their schools and suspended classes in all their territories and at all academic levels due to the health emergency.

The u-Learning learning modality increased exponentially worldwide, using the Smartphone as the main technological mediator; this modality has become the precise alternative in Pandemic Covid-19, to supply the educational needs of children and young people particularly in public institutions located in rural environments in Colombia where there is greater access to a Smartphone than to a laptop DANE (2018). The above situation led to raise as a fundamental purpose of the present research to determine the influence of the pedagogical use of the Smartphone on academic performance and virtual education in high school, in rural educational Institutions in the municipality of Toledo, department of Norte de Santander, Colombia, during the 2020 pandemic; thus allowing to know firsthand the perceptions that teachers of Rural Educational Institutions have of the good use that can be given to the Smartphone as a pedagogical tool in the teaching-learning processes even in rural areas where difficulties persist in connectivity and access to technology. In the literature review work, similar research was found such as Lagunes et al. (2017), Leon (2017), Melo (2017), Poyatos (2017), Rentería & Ayala, (2017), Arenas, (2018), Pinos et al. (2018), Vilches & Reche, (2019), Mangisch, G. & Mangisch, M. (2020), Yangali, Arboleda & Arispe, (2020), among other research on

the educational use of mobile devices, in virtual education and process mediated by ICT tools connected to the internet; However, most of these researches were carried out in university contexts and few in institutions of basic secondary education, these research works were developed in urban contexts where there is greater access to technological devices and greater capacity for internet connectivity; it is here the relevance of this research that was developed in a rural context with all the difficulties and limitations that it frames.

2. Methodology

The population was constituted by approximately 50 teachers who teach at least one of the five fundamental areas and of greater hourly intensity in the educational institutions, namely: Natural Sciences, Social Sciences, Spanish, English and Mathematics, of basic secondary and technical middle school in one of the 5 rural educational institutions in the municipality of Toledo, Department of Norte de Santander, Colombia. In the research, a non-probabilistic census sample by convenience was proposed as established by Hernández-Sampieri & Mendoza (2018), due to the fact that all members of the population were allowed to participate in the research; Table 1 shows the teachers who participated in the research by educational institution for the application of the instruments.

Table 1

Participating teachers per school.

School	School Code	Number of teachers
CER La Capilla	CLC	5
CER Santa Barbara	CSB	2
I.E. San Bernardo	ISB	15
I.E. Samore	IES	14

I.E. Gibraltar	IEG	14
Total		50

Source Authors' elaboration

Variables

A variable is an attribute that can be measured and observed Hernández et al. (2014), so for this research three variables were defined, one independent and two dependent:

Independent Variable

Pedagogical use of the Smartphone: This variable refers to the didactic use of the Smartphone made by teachers to integrate them in the teaching-learning processes, thus allowing the social interaction of the teacher with the students and among the students themselves. This information was obtained by applying the survey technique through a Lickert scale questionnaire to the teachers of the complete and rural educational institutions of the municipality of Toledo, Norte de Santander.

Dependent variables

Academic performance, refers to the grades that teachers give to students for their work developed in a certain period of time Edel (2003); for the present research the grades issued by teachers in five fundamental areas such as: Mathematics, Natural Sciences, Social Sciences, Spanish and English, during the year 2020.

Virtual education, The MEN (2010) defines virtual education as any educational process that takes place outside the physical classroom, without the need for the physical presence of students and teachers, being cyberspace one of the most used options to sustain synchronous or asynchronous educational encounters. In order to

carry out the educational process in the virtual modality, the four dimensions established by the Ministry of National Education must be addressed, which are: the pedagogical dimension, the technological dimension, the organizational dimension and the communicative dimension. For the present research this variable was through the application of a questionnaire to teachers where the incidence of the independent variable on the dependent variable was observed.

Data processing and analysis

For the processing of the data collected with the instruments described above, Microsoft Word software was used to process the texts, Microsoft Excel to organize the database and the IBM - SPSS v25 program for the processing and statistical analysis of the data. After the statistical processing of the data, the respective interpretations of these results were made, making it possible to confront the hypotheses initially proposed, to establish the discussion of results, conclusions and recommendations pertinent to the purpose of the research.

3. Results and discussion

Table 2
Descriptive Statistics

Description	Work experience	Males	%	Females	%	Sub Total	Total
		25	50%	25	50%	50	100%
Academic degree							
Graduates		10	20%	7	14%		
Specialists		8	16%	15	30%		
Magister		7	14%	3	6%		
School							
I. E. Gibraltar	13 < 5 years 1 > 5 years					14	28%
I. E. la capilla	5 < 5 years					5	10%
I.E. Samore	13 < 5 years 1 > 5 years					14	28%
I.E Santa Barbara	2 < 5 years					2	4%

I.E. San Bernardo	14 < 5 years years	1 > 5	15	30%
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The study formulated hypotheses that were tested as detailed in Table 3 and Table 4.

Ha: There is influence of the pedagogical use of the Smartphone, on academic performance and virtual education in secondary school, in rural educational institutions in the municipality of Toledo, department of Norte de Santander, Colombia, during the pandemic 2020.

Ho: There is no influence of the pedagogical use of the Smartphone, on academic performance and virtual education in secondary school, in rural educational institutions in the municipality of Toledo, department of Norte de Santander, Colombia, during the pandemic.

Table 3

Research hypothesis testing

	Information on model adjustment		
Model	-2 likelihoodChi-square	log gl	Sig.
Intersection only	208,882		
Final	168,926	39,95615	,000

Link function: Logit.

Observing table 3, we have that the sig. value = 0.000 < 0.05 therefore the null hypothesis is rejected and the alternative hypothesis is accepted, i.e. there is influence of the pedagogical use of the Smartphone, influencing the academic performance of students in the framework of virtual education in secondary education, in rural educational institutions in the municipality of Toledo, department of Norte de Santander, Colombia, during the pandemic year 2020.

Table 4

Level of influence of pedagogical use of Smartphone on academic performance and virtual education in secondary school.

Pseudo R-squared	
Cox and Snell	,550
Nagelkerke	,553
McFadden	,145
Link function: Logit.	

Source: Authors' elaboration.

According to the results observed in the present research, the potential offered by the Smartphone as a pedagogical tool, which influences academic performance in the framework of virtual education in elementary and middle school students in rural educational institutions, can be seen.

By making the correlation between the independent variable Pedagogical use of the Smartphone with the dependent variables academic performance and virtual education, relevance is given to the conclusion that Pinos et al. (2018) proposed in their research when making the call to use the Smartphone for educational purposes decreasing the misuse that schoolchildren make of this device, which increases its availability and accessibility in children

and young people of school age, even in rural areas of the geography of the municipality of Toledo and quite possibly of the national geography of Colombia (DANE, 2018).

When evaluating the influence that the pedagogical use of the Smartphone has on academic performance and virtual education in the midst of the pandemic in rural educational institutions of basic secondary and technical middle school in the municipality of Toledo, we can affirm with high precision that the pedagogical use of the Smartphone has a very significant influence of 55.3% on academic performance and virtual education.

This confirms what Rentería & Ayala (2017) express when they state that the use of mobile devices influences learning performance in the research was observed in the cases of the subjects of mathematics, natural sciences, social sciences, Spanish and English; in virtual or distance education to which most of the educational institutions worldwide were forced on the occasion of the Covid-19 pandemic (UNESCO, 2020b).

This finding contrasts with Mangisch & Mangisch (2020), when they state that the didactic use of new and increasingly widespread mobile technologies should be maximized to strengthen teaching and learning processes at all academic levels, and this is the responsibility of managers and teachers.

Analyzing these results strengthens the thesis of Ortega (2019) when he states that the pedagogical use of ICT tools such as computers and cell phones motivates learning in students and improves the school climate in educational institutions, thus projecting the pedagogical use of the Smartphone not only in the midst of the pandemic, On the contrary, its pedagogical use should be potentiated in all educational institutions in the post-pandemic period, since its acquisition is becoming more widespread every day and if it is not properly used in educational processes at any academic level, it can become an obstacle to achieve effective teaching and learning processes at all academic levels.

4. Conclusion

With this research it was determined that the influence of the pedagogical use of the Smartphone in academic performance and virtual education in secondary school, in rural educational institutions in the municipality of Toledo, department of Norte de Santander, Colombia, during the pandemic 2020 is very significant, which favors the good use of the Smartphone for educational purposes in rural official educational institutions, which will result in very good results in terms of academic performance and the possibilities of virtual education in the post-pandemic period.

Likewise, it was possible to determine with very good precision the influence that access to Smartphones by teachers and students has on academic performance and virtual education in secondary schools in the educational institutions in the municipality of Toledo, department of Norte de Santander, Colombia, during pandemic 2020, which is significant according to the rural context in which the research was developed, evidencing in some way the technological gap between rural and urban educational contexts; however, even with this gap, the pedagogical use of Smartphones in rural educational contexts is possible.

Regarding the influence exerted by the didactic use options offered by the Smartphone on academic performance and virtual education in high school, in rural educational institutions in the municipality of Toledo, department of Norte de Santander, Colombia, during the 2020 pandemic, it can be concluded that such influence is quite significant since the didactic use options offered by the Smartphone are very diverse and every day are increasing in number and usefulness, which favors the possibilities of positive use of the Smartphone in the teaching-learning processes.

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