

## Virtual education, an engine to increase learning in the pandemic

### La educación virtual, un motor para aumentar el aprendizaje en la pandemia

MONCADA-RODRÍGUEZ, Gloria Rebeca†\*, VILLARREAL-SOTO, Blanca Margarita, ESPERICUETA-MEDINA, Marta Nieves and GONZÁLEZ-CEPEDA, María Cristina

*Universidad Autónoma de Coahuila, Faculty of Science, Education and Humanities, Mexico.*

ID 1<sup>st</sup> Author: *Gloria Rebeca, Moncada-Rodríguez* / **ORC ID:** 0000-0003-2636-3646, **Researcher ID Thomson:** AGO-1766-2022, **CVU CONACYT ID:** 1196981

ID 1<sup>st</sup> Co-author: *Blanca Margarita, Villarreal-Soto* / **ORC ID:** 0000-0001-9314-8001, **Researcher ID Thomson:** T-2357-2018, **CVU CONACYT ID:** 947979

ID 2<sup>nd</sup> Co-author: *Martha Nieves, Espericueta-Medina* / **ORC ID:** 0000-0002-4924-7632, **Researcher ID Thomson:** T-1500-2018, **arXiv Author ID:** Espericueta2018, **CVU CONACYT ID:** 372705

ID 3<sup>rd</sup> Co-author: *María Cristina, González-Cepeda* / **ORC ID:** 0000-0003-0676-2412, **Researcher ID Thomson:** T-1651-2018, **CVU CONACYT ID:** 567204

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#### Abstract

The objective of this article is to know how virtual education intervenes in the learning process of students in Technical Secondary School No. 4 vs. General Secondary School No. 11 during the pandemic. The research that was carried out is of a comparative and differential type since two populations will be analyzed in order to know the learning process in virtual education; it is also of a preliminary nature since it will only have one moment in the validation of the external data. The instrument had 83 variables on a decimal ratio scale and 6 general data items. The statistical treatment was based on five levels in order to obtain validity and confidence in the information. The main results of the research highlight that carrying out a practice of the topics seen enhances the learning process in the subjects. The research concludes that the most suitable education for men is the virtual one since they generate a greater type of interrelationships, abilities, skills, communication and social situations that favor a quality education. It is proposed to carry out a course focused on virtual education to learn about technological tools.

#### Resumen

El objetivo del presente artículo es conocer como interviene la educación virtual en el proceso de aprendizaje de los alumnos en la Secundaria Técnica N°4 vs la Secundaria General N°11 durante la pandemia. La investigación que se realizó es de tipo comparada y diferencial ya que se estarán analizando dos poblaciones con para conocer el proceso de aprendizaje en la educación virtual; además es de corte perimental ya que tendrá un solo momento en la validación de los datos externos. El instrumento contó con 83 variables en una escala decimal de razón y 6 ítems de datos generales. El tratamiento estadístico fue a partir de cinco niveles con el propósito de obtener validez y confianza en la información. Los principales resultados de la investigación destacan que el realizar una práctica de los temas vistos potencializa el proceso de aprendizaje en las materias. La investigación concluye que la educación más idónea para los hombres es la virtual ya que generan un mayor tipo de interrelaciones, habilidades, destrezas, comunicación y situaciones sociales que favorecen a una educación de calidad. Se propone la realización de un curso centrado en la educación virtual para conocer lo referente a las herramientas tecnológicas.

**Pandemic, Technological, Comparative**

**Pandemia, Tecnológica, Comparativo**

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\*Correspondence to Author (E-mail: gmoncada@uadec.edu.mx)

† Researcher contributing as first author.

## Introduction

Virtual education is a phenomenon that has favored education, because in this modality students can learn from different spaces, hence the question of how does virtual education intervene in the learning process of students of the Technical Secondary School No. 4 and General Secondary School No. 11 during the pandemic?

The subject of the research focuses on virtual education because it is a problem that is currently being presented, in contrast to the learning process because it wants to analyze the levels of knowledge that students have acquired in times of pandemic.

With this analysis, it is intended that adolescents can detect if they have really acquired learning during their virtual education process during the pandemic, in order to create a solution to this problem.

The main beneficiaries of this research will be the students of Technical Secondary School No. 4 and General Secondary School No. 11, since it is intended to know how their learning process has been during the pandemic; however, the population will be benefited since students will be able to measure how much they have learned in virtual education, finally, society as a whole will benefit by having elements that favor virtual education.

The sections that will be addressed throughout this article focus on the following: the theoretical perspective, which consists of presenting a review of the main authors who offer their theoretical contributions to the phenomenon under study, and in this way have a more broad when investigating; the methodology to be developed, in which the type of research is exposed, the sample with which it was worked and the strategic line on which the choice of the topics to be studied was based; the results, in which the most significant data derived from the five statistical levels (frequencies and percentages, characterization, correlation, comparison and integration) are displayed; the conclusions, where a detailed and summarized synthesis of the contributions provided by the research is made and finally the bibliographical references.

## Theoretical Perspective

Throughout history it has been detected that virtuality is a phenomenon that has favored education. In the field of virtual education, you can learn from various places and platforms because in this modality it is not necessary for a group of people to attend a school.

Pinto and Cuervo (2021), mention that the importance that online education has acquired in 2020 is an unprecedented fact that will mark a before and after in pedagogical practices and in current educational systems at a global level that will bring as a challenge to reduce maximize the negative impact that this pandemic will have on learning and education, and take advantage of this experience to resume an accelerated path of improvement in learning. As education systems face this crisis, they must also plan how to recover, with a renewed sense of responsibility from all actors and with a better understanding and sense of urgency of the need to ensure that everyone has an equal chance of success. receive a quality education.

In order to achieve a virtual education that meets the quality parameters, from the perspective of the authors Marciniak and Gairín (2020), it is necessary to attend to and analyze how the technological infrastructure of both the teacher and the student is; pedagogical aspects (training objectives, materials, teaching resources, online learning activities, evaluation, teaching strategies through platforms, tutoring); teachers (online teacher development); the students (characteristics of the learners); the structure and content of the disciplinary areas is relevant to offer training according to the needs; and satisfactory environment in the virtual classroom where participation, enthusiasm and dynamism are promoted.

For their part, Expósito and Marsollier (2020), add that virtual education establishes a different scenario for teacher-student communication, in addition, the use of technological resources originates novel ways of application and interrelation according to each context. Therefore, when referring to an educational process in a virtual modality, digital tools such as platforms, websites, computer equipment, etc., will be involved, which will represent substantial support for the construction of learning.

From all this uncertain panorama, Cabrera (2020), raises a series of questions that are the subject of debate in the current situation: what will become of the education system? Will inequality of opportunity widen? Will it increase competitiveness? Will personal and social relationships radically change? Will virtuality spread in the future or will it live with us permanently? Does it affect all students? All these questions and more haunt the family, students, teachers and researchers in education and society since they must respond to the uncertainty and changes that are coming, therefore, it is essential to analyze and contemplate in detail everything that education implies. virtual.

It should be noted that virtual education is related to the learning process, considering that this is the way in which students follow methodological processes in order to acquire knowledge.

### Methodology to develop

The research that is being carried out is of a comparative and differential type since two populations will be analyzed to know the learning process in virtual education; it is also of a preliminary nature since it will only have one moment in the validation of the external data.

Therefore, two populations with differences in their operating characteristics were selected, which will be 50 students from Technical High School No. 4 and 50 students from General High School No. 11, since it is expected to know the number of students who have acquired learning in their virtual education. The concordance refers to the fact that both are at a basic level, however, one is of a technical nature and the other of a general nature, in addition to the fact that the population has the same age range.

Regarding the processing of the relative frequencies that were obtained, the instrument was processed in order to obtain validity and confidence in the information.

### Results

With the purpose of providing a reliable and scientifically rigorous explanation to the research axes which correspond to the virtual education theme and the learning process contrast, the relative frequencies were processed, which were collected through the online instrument, using Statistica 7 and Excel programs in order to explain the phenomenon statistically through the levels of frequencies and percentages, characterization, correlation, comparison and integration.

#### *Frequencies and Percentages*

The purpose of processing the frequencies and percentages section is to characterize the study population so that once the levels of confidence in the phenomenon are reached, the information can be extrapolated to other populations with the same characteristics, which It involves generalization of data. At this level, it operates with signal variables which correspond to:

#### *Age*

Table 1 shows that the least part of the participating population is 16 years old, which is reflected in the fact that its frequency is 2, which is equivalent to 1%, however, the majority is represented by 14 years, denoting a frequency of 135 equivalent to 80% of the subjects. It is inferred that 14-year-old students are the most represented, therefore, the information can be extrapolated to other populations with this characteristic as long as the variables of the phenomenon present the confidence levels.

Age	Frequency	Percentage
14	135	80%
15	31	19%
16	2	1%
Total	168	100%

**Table 1** Statistical behavior of frequencies and percentages of the age variable (2022)

### Gender

With regard to table 2, it is observed that the least part of the surveyed group are men, which is reflected in the fact that their frequency is 73, which is equivalent to 43.5%, however, the majority is represented by women, corresponding at a frequency of 95, which is equivalent to 56.5% of the population. It is inferred that the female gender is the one that is mostly represented.

Gender	Frequency	Percentage
Female	95	56.5%
Male	73	43.5%
Total	168	100%

**Table 2** Statistical behavior of frequencies and percentages of the gender variable (2022).

### School adaptation

Table 3 shows that the least part of the group surveyed did not adapt to virtual education, which is reflected in the fact that its frequency is 64, which corresponds to 38%; however, the majority is represented by the that if they adapted to virtual education with a frequency of 104, which is equivalent to 62% of the population. It is inferred that the students who adapted to virtual education are predominant in the research.

Education	Frequency	Percentage
No	64	38%
Yes	104	62%
Total	168	100%

**Table 3** Statistical behavior of frequencies and percentages of the school adaptation variable (2022)

### Characterization

Table 4 shows the behavior of the mean, where it is read that the variables found in low values (0,1,2,3), technological resources ( $X=3.93$ ), adaptation ( $X=2.92$ ), change ( $X=3.92$ ), virtual classroom ( $X=1.89$ ), model ( $X=3.45$ ), school ( $X=1.96$ ) and extracurricular activities ( $X=1.63$ ). It is inferred that the pandemic has brought an educational lag, therefore, virtual environments do not favor significant learning processes.

Variables	X
Technological resources	3.93
Adaptation	2.92
Change	3.92
Virtual classroom	1.89
Model	3.45
School	1.96
Extracurricular activities	1.63

**Table 4** Statistical behavior of mean, (2022)

### Correlation

Next, the correlation readings that were significant are presented, taking into account a probability of  $p=.000001$  with a correlation level of  $r=0.31$ .

### Correlation of the opportunities variable

Table 5 shows that when teachers provide students with opportunities, they better understand the educational programs ( $r=0.49$ ) that were implemented during the pandemic to promote their training ( $r=0.45$ ) and this has increased motivation in students. students ( $r=0.47$ ). It is inferred that educational programs enhance the opportunities of virtual education.

Correlation Opportunities	r value
Educational programs	0.49
Motivation	0.47
Training	0.45

**Table 5** Correlational behavior of the opportunities variable (2022)

### Correlation of the interaction variable

Table 6 shows that interaction is a key factor in group work ( $r=0.46$ ) in which the participation ( $r=0.44$ ) and collaboration of all students ( $r=0.47$ ) must be implemented. It is inferred that when students are active in their education, this increases their knowledge.

Correlation Interaction	r value
Group work	0.46
Collaboration	0.47
Participation	0.44

**Table 6** Correlational behavior of the interaction variable, (2022)

### *Correlation of the methodologies variable*

Table 7 shows that the methodologies implemented by teachers are linked to self-regulation by students ( $r=0.46$ ), in this equity is implemented ( $r=0.47$ ) at the time the teacher motivates them to continue learning ( $r=0.48$ ). It is inferred that motivation potentiates the method that the teacher implements for learning.

Correlation Methodologies	r value
Self- regulation	0.46
Motivation	0.48
Equity	0.47

**Table 7** Correlation behavior of the methodologies variable (2022)

### *Correlation of the collaboration variable*

Table 8 analyzes that during the pandemic, collaboration between students was represented by group work ( $r=0.56$ ) in various subjects ( $r=0.43$ ), and this has raised the levels of self-management related to participation in decision-making. of decisions in the classroom ( $r=0.50$ ). It is inferred that group work enhances collaboration in virtual education.

Correlation collaboration	r value
Group work	0.56
Self- management	0.50
Subjects	0.43

**Table 8** Correlational behavior of the collaboration variable (2022)

### *Correlation of the practical variable*

Regarding table 9, it is explored that when students carry out exercises to reinforce a topic as practice, they develop their critical analysis ( $r=0.42$ ), thus improving their communication ( $r=0.43$ ) in the various subjects ( $r= 0.48$ ) in order to present the needs to the teacher ( $r=0.46$ ). It is inferred that carrying out a practice of the topics seen enhances the learning process in the subjects.

Correlation practical	r value
Critical analysis	0.42
Communication	0.43
Needs	0.46
Subjects	0.48

**Table 9** Correlational behavior of the practical variable, (2022)

### *Correlation of the communication variable*

Table 10 shows that communication in virtual classes is a factor of the participation that students have ( $r=0.64$ ) in the different subjects ( $r=0.50$ ) and this has favored self-management in relation to students participating. in the decisions made in the classroom ( $r=0.56$ ) to meet their needs ( $r=0.59$ ). It is inferred that student participation enhances learning processes.

Correlation communication	r value
Stake	0.64
Subjects	0.50
Needs	0.59
Self- management	0.56

**Table 10** Correlational behavior of the communication variable, (2022)

### Comparison

In the lower part, the comparisons are exposed to observe the concordances and differences using the student's t statistic of two groups in the signal variables of gender and school.

### *Comparison of the gender variable*

In order to find the significant differences between the Gender variable and the variables that correspond to the study phenomenon, a Student's t-test was performed for independent samples in the Statistica 7 program, with a probability of 0.05, with the purpose of accepting or reject the null hypothesis, with a sample of 168 students with a difference in the Gender variable in male and female, all of the above can be seen reflected in table 11.

Variables	X		t-value			
	M	F	df	p	p	
Interrelationship	5.7	4.59	2.24	166	0.03	0.78
Students	5.9	5.14	1.98	166	0.05	0.27
Social environment	5.8	4.56	2.62	166	0.01	0.50
Skills	6.23	4.85	2.74	166	0.01	0.34
Abilities	5.34	4.16	2.28	166	0.02	0.96
Communication	6.25	5.18	2.05	166	0.04	0.37

**Table 11** Comparative behavior of the independent variable gender (2022)

As shown in table 11, in the interrelationship variable, it can be read that women are the ones who hardly communicate through virtual education ( $x=4.59$ ) while men are the ones who present the greatest communication in this modality ( $x=5.73$ ). It is inferred that the most comfortable in this type of education are men, since they are the ones who present the most ease in their interrelation.

In the student variable, it is observed that women have presented greater difficulty in entering virtual classes ( $x=5.14$ ) while it is easier for men to attend meetings ( $x=5.97$ ). It is inferred that men have been more aware of distance classes for their training.

In the social environment variable, it can be read that women presented greater problems when dealing with society during the pandemic ( $x=4.56$ ), while men have managed more easily ( $x=5.89$ ). It is read that virtual education has favored men in their social development.

In the skills variable, it is observed that women have found it difficult to express themselves ( $x=4.85$ ), on the contrary, men have been more expressive ( $x=6.23$ ). It is inferred that during the pandemic men developed their ability to express themselves more.

In the abilities variable, we read that women need to be more focused on the subject in order to learn ( $x=4.16$ ) while men can learn with distractions ( $x=5.34$ ). It is inferred that men have the facility to learn with noise and this facilitates their virtual education.

In the communication variable, it is observed that in general, women do not present their doubts to the teacher ( $x=5.18$ ), on the contrary, men ask the teacher about their concerns ( $x=6.25$ ). It is inferred that men feel safer when presenting their doubts in virtual education.

It is generally inferred that the most suitable education for men is virtual since they generate a greater type of interrelationships, abilities, skills, communication and social situations that favor a quality education.

### Comparison of the school variable

In order to find the significant differences between the School variable and the variables that correspond to the study phenomenon, a Student's t-test was performed for independent samples, which is evidenced in Table 12. It should be noted that we worked with a probability of 0.001, in order to accept or reject the null hypothesis, with a sample of 168 students from General High School No. 11 and Technical High School No. 4.

Variables	X		df	p	p
	General N° 11	Technique N°4			
Session	9.19	3.89	166	0.00	0.00
Training	7.76	6.12	166	0.00	0.14
Continuous	8.87	7.71	166	0.00	0.00

**Table 12** Comparative behavior of the independent variable school (2022)

In the session variable, it can be read that in technical secondary school No. 4, the students did not attend virtual classes daily ( $x=3.89$ ), while in general secondary school No. 11, the students adapted to the distance modality ( $x=9.19$ ). It is inferred that in general high school No. 11 there will be a lower educational gap because the students continued to learn day by day.

In the training variable, it is observed that the students of the technical secondary school No. 4 are not satisfied with the education they are receiving at a distance ( $x=6.12$ ) while the students of the general secondary school No. 11 are satisfied with their education ( $x=7.76$ ). It is inferred that the teachers of general high school No. 11 implemented the necessary strategies to transmit knowledge.

In the continuous variable, it is read that the students of the technical secondary school No. 4 have presented periods of time in which their education has been interrupted ( $x=7.71$ ), while in the general secondary school No. 11 the students have had a without interruptions during the pandemic ( $x=8.87$ ). It is inferred that general high school No. 11 has implemented its curriculum adequately.

It is inferred in a general way that the general secondary No. 11 has shown greater interest in the students having adequate training, for which they have implemented the necessary strategies so that their students do not show a greater educational lag, likewise the students have not had interruptions in their learning process which will favor their education.

### *Integrational*

In this segment, the integration analysis based on factorial statistics is exposed, integrating the 168 students and 86 variables that make up the investigation of the parametric statistics of the phenomenon under study; with a main method R2= multiple communities with a normalized Varimax rotation, a sigmatic cut-off Eigenvalue of 1, a level of  $p=.000000001$  and an  $r=.46$ .

### *Intrafactorial Analysis*

#### Factor 1: Educational aspects

Table 13 shows the first factor that corresponds to the teacher's responsibility to motivate ( $\exp=0.64$ ) and guide students in the learning process ( $\exp=0.80$ ) as well as to make innovations in the content ( $\exp=0.80$ ).  $=0.66$ ) so that these are important topics ( $\exp=0.74$ ) that cause interest in the students ( $\exp=0.47$ ), since in this way they will better understand the explanations ( $\exp=0.49$ ), however, the teacher must be flexible ( $\exp=0.68$ ) in relation to retaking those topics that are not clear to the students ( $\exp=0.67$ ) so that there is greater participation on the part of the students ( $\exp=0.48$ ) as well as giving them the opportunity to improve a task or activity ( $\exp=0.57$ ), for this, the teacher presents the way he will have to work during the course ( $\exp=0.71$ ) and the way to evaluate ( $\exp=0.67$ ) following a teaching methodology ( $\exp=0.60$ ) so that the students are satisfied with the education they are receiving ( $\exp=0.47$ ) and there is coverage ( $\exp=0.52$ ) equally ( $\exp=0.62$ ). It is inferred that the learning process during a pandemic depends largely on the actions implemented by the teacher.

Factor 1	Factor loading
Motivation	0.64
Accompaniment	0.80
Innovation	0.66
Relevance	0.74
Contents	0.47
Pedagogical	0.49
Flexibility	0.68
Orientation	0.67
Inclusion	0.48
Opportunities	0.57
Educational program	0.71
Planning	0.67
methodologies	0.60
Training	0.47
Coverage	0.52
Equity	0.62

**Table 13** Intrafactorial statistical behavior of educational aspects (2022)

#### Factor 2: Work Links

Table 14 shows that if the students live together ( $\exp=0.81$ ) and talk to each other ( $\exp=0.77$ ), most of them become friends ( $\exp=0.83$ ) and in this way help each other when they need it ( $\exp=0.59$ ). ), which favors collaboration ( $\exp=0.56$ ) and participation in group work ( $\exp=0.49$ ), as well as intervening in classroom decisions ( $\exp=0.53$ ), with this the students better express their ideas ( $\exp =0.61$ ) and present their doubts to the teacher ( $\exp=0.47$ ), this develops the ability to express themselves ( $\exp=0.57$ ) and function in society ( $\exp=0.60$ ). It is inferred that the links established between students favor their learning process.

Factor 2	Factor loading
Interaction	0.81
Interrelationship	0.77
Self-management	0.53
Team work	0.49
Collaboration	0.56
Communication	0.47
Skills	0.57
social environment	0.60
Support for	0.59
Ideas	0.61
Links	0.83

**Table 14** Intrafactorial statistical behavior of work relationships (2022)

#### Factor 3: School factors

In relation to table 15, it is read that the students have a quality education (exp=0.66), because they are learning (exp=0.63) and acquiring the appropriate knowledge during the pandemic (exp=0.60), in this way students meet their educational objectives (exp=0.53) and are satisfied with their education (exp=0.61). It is inferred that receiving a quality education enhances the learning process during the pandemic.

Factor 3	Factor loading
Quality	0.66
Knowledge	0.60
To learn	0.63
Training	0.61
Objectives	0.53

**Table 15** Intrafactorial statistical behavior of school factors (2022)

#### Factor 4: Educational exploration

Regarding table 16, it is explored that when students are satisfied with their education (Exp=0.68) they follow the instructions given by the teacher (Exp=0.61), they carry out their activities in the established time (Exp=0.59), make an effort to do (Exp=0.54) and fulfill their tasks during the pandemic (Exp=0.63), in addition to researching various sources to clarify their doubts (Exp=0.69) and understand a topic (Exp=0.57) with this they build their own definitions (Exp=0.50) and use a critical analysis in classes (Exp=0.53), these actions have a purpose (Exp=0.57), related to the understanding of the subjects (Exp=0.59) and have fundamental elements when studying for an exam (Exp=0.49). It is inferred that researching in various parts broadens the knowledge acquired by students and favors their learning process.

Factor 4	Factor loading
Responsibility	0.63
Self-regulation	0.57
Instruction	0.61
Study	0.49
Subjects	0.59
Activities	0.56
Research	0.69
Critical analysis	0.53
Training	0.68
constructivism	0.50
Effort	0.54
Explore	0.57

**Table 16** Intrafactorial statistical behavior of educational exploration (2022)

#### Factor 5: School Tools

At the bottom is Table 17, which highlights that during the pandemic, students have handled computer applications more easily (exp=0.61), so with this medium it is easier for them (exp=0.74) to enter virtual classes (exp=0.48), do their homework (exp=0.71) and save them on digital platforms (exp=0.54). It is inferred that technological resources have played a fundamental role in the distance modality.

Factor 5	Factor loading
Technological resources	0.71
Tools	0.74
Class	0.48
Digital platforms	0.54
Software	0.61

**Table 17** Intrafactorial statistical behavior of school tools (2022)

#### Conclusions

Next, the conclusions are presented through intervention proposals for the research axes in order to enhance excellence at the secondary level. For this reason, it was of special relevance that the data processing was carried out with a support in parametric statistics, in this way to achieve the criteria of reliability and validity in the results. Therefore, the contributions to generate a change for the benefit of the school community to improve the teaching-learning processes are observed below:

- Take the data to a congress where this topic can be presented, as well as its results.
- Carrying out a course focused on virtual education where it implies knowing what is related to technological tools.
- Disseminate the results in general high school No. 11 and in technical high school No. 4 so that both can know their areas of opportunity and thus offer a better quality education.
- Disseminate the results through social networks such as Facebook so that society in general learns more about virtual education.



- Disseminate the results to various secondary schools in the state so that the teaching staff can identify areas of opportunity for their virtual classes.
- Take the results to the state congress so that the importance of virtual education is debated and an educational policy is established that favors the implementation of strategies to improve learning processes in the distance mode.
- Establish an intervention model focused on distance education as a potential factor in educational quality.
- Establish dynamics in schools so that students can give their opinion related to the implementation of the distance modality.

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