

## Education in pandemic times: A student vision of the contrast between presential and online education

### La educación en los tiempos de pandemia: Una visión estudiantil del contraste entre la educación presencial y en línea

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#### Abstract

With the goal of know and evaluate the face-to-face education previous to the pandemic and contrasting it with the education accomplished during the COVID 19 pandemic, this research was carried out on undergraduate students. A survey was applied, previously validated (Ortiz-Sánchez *et al.*, 2021), the results allow to know aspects related to ideas that students have expressed during the exercise of online classes and in pre-pandemic. The research was carried out with students of different levels and areas of academic preparation. The results show that in higher education there is a great sense of adaptation to both forms of learning, with a slight tendency to be more interested in face-to-face education, with no significant differences between the opinions shown by the results between online education and face-to-face education. The known of these data can provide the establishment of actions and direction to appropriate methodologies for the future development of the emerging mixed education.

#### Exploration, Attitudes, Education.

#### Resumen

Con el objetivo de conocer y evaluar la educación presencial previa a la pandemia y contrastarla con la educación llevada durante la pandemia del COVID 19, se realizó la presente investigación a estudiantes de Licenciatura. Se aplicó una encuesta, validada previamente (Ortiz-Sánchez *et al.*, 2021), los resultados permiten conocer aspectos relacionados con ideas que manifiestan los estudiantes durante el ejercicio de clases en línea y en prepandemia. La investigación fue realizada con estudiantes de diferentes niveles y áreas de preparación académica. Los resultados muestran que en educación superior existe gran sentido de adaptación a ambas formas de aprendizaje, con una ligera tendencia a interesarse más por la educación presencial, sin haber diferencias significativas entre las opiniones que muestran los resultados entre la educación en línea y educación presencial. Conocer estos datos puede proveer el establecimiento de acciones y direccionar metodologías adecuadas para el futuro desarrollo de la emergente educación mixta.

#### Exploración, Actitudes, Educación

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## Introduction

Faced with the COVID 19 pandemic, educational institutions have implemented programmes to continue virtual education through the use of Information and Communication Technologies (ICT), tools that have been indispensable for communication between teachers and students.

On the other hand, the different manifestations of the crisis that this pandemic has caused (Chiappe & Wills, 2022) have been recently exposed, including problems related to the workload and lack of digital preparation of teachers, mental health, social and economic aspects and above all educational aspects, highlighting numerous weaknesses in the educational and social systems. Since there was no defined strategy to follow when distance education was initiated, let alone how to deal with the problems that arose.

Few exploratory studies are known of the opinions of the different actors in the higher education sector: students, teachers and administrative staff, related to the necessary competences they had to have in order to develop a different educational process during the pandemic, such as connectivity, lack of technical resources, among others. In Mexico, INEGI, a government agency, applied the survey via telephone (INEGI, 2021); it inquired about the advantages and disadvantages of distance and virtual classes for households with telephones and population aged 3 to 29 years old. Among the main advantages mentioned were not putting the students' health at risk (56.4%), family coexistence (22.3%) and saving money on various expenses such as fares and school materials (19.4%). Disadvantages were also mentioned as: not learning or learning less than face-to-face was the most mentioned with 58.3%, followed by the lack of monitoring of students' learning with 27.1%, and the lack of technical or pedagogical capacity of parents or tutors to transmit knowledge with 23.9%.

In higher education, there are delays in the publication of official statistics for the 2020-2021 and 2021-2022 school cycles (the latter is about to end).

The delay in the availability of these figures is worrying, as they are necessary to calculate failure and/or dropout rates from the beginning of the emerging virtual education, another manifestation of the difficulties of communication between students, schools and authorities during the pandemic.

A document issued by Unesco (UNESCO.IESALC, 2020), in addition to providing relevant data such as the number of computers and connectivity in schools and homes, attempts to provide a generalised overview of some questions about the impact of the pandemic on higher education; however, it is limited to giving recommendations regarding the avoidance of health risks and proposes a temporary closure, a rather questionable recess of activities in this sector. Aguilar Gordon (Gordón, 2020) considers that it was precisely this forced social isolation that motivated this emergent accommodation, which gave rise to distance education, mentioning its importance, in addition, within the disadvantages of virtual education to the factor of social inequality and the challenges when facing online education, referring to a series of political, economic, psychosocial, educational and cultural difficulties developed at all levels of education, suggesting that the successful use of technological resources could generate quality education.

Today, in higher education, the return to face-to-face classes is a fact, and mention is made of a possible return in a so-called "hybrid" or "mixed" modality, with distance education also being offered in some degree courses, and as in primary, middle and high school education, the return to face-to-face classes, without an objective assessment having been made of the advantages and disadvantages that this stage of virtual education represented; and the academic situation, the competences that show good academic achievement (Torres *et al.*, 2021) and the possible causes of current dropout and failure. The results of research on these aspects could be contrasted with the international findings on virtual and face-to-face education. This article gives an overview of the research idea in its introduction, followed by the methodology, which is extensively explained, the results, which are discussed, and the conclusions regarding the results obtained.

## Methodology

In order to find out the positive or negative aspects of face-to-face and distance education during the COVID 19 pandemic and which could be a factor favouring or determining student dropout or failure, the 45-question survey (Cronbach's alpha 0.85; sample adequacy index KMO 0.884) previously validated by Ortiz-Sánchez (Ortiz-Sánchez *et al.*, 2021); 174 students were selected from a population of 306 TecNM students by stratified random sampling, who voluntarily, objectively and honestly answered the survey.

Students from different degrees and semesters participated: Computer Systems Engineering (ITMérida) were students in 4th, 7th and 8th semesters; Biochemical Engineering, Basic Sciences and Electrical Engineering (ITTuxtla-Gutiérrez) in 3rd, 4th and 9th semesters, there was a case of students who asked to be allowed to answer the survey, making a total of 192 surveys conducted, the percentage of IBQ students represent 27.77% and those of ISC are 33% CB and IE 39.21% approximately, being all of them the subject of the present investigation.

The survey was provided to them through a mobile application developed in this research for this purpose. In the survey, 4 aspects were considered for evaluation: 1) Attitudes during the Covid19 pandemic, 2) ICT applications in education, 3) Problems when studying online during the pandemic and 4) Exploration of face-to-face education. An ordinal Likert-type rating scale of 1 to 5 was chosen, with 1 being the minimum and 5 the maximum. The score indicates the student's opinion on each of the questions, ranging from strongly disagree to strongly agree. The statistical programme SPSS v23 was used to analyse the results.

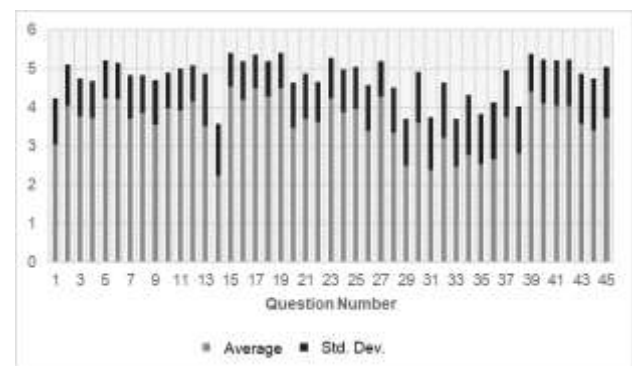
## Results

The change from face-to-face to online education occurred unexpectedly. Neither the teachers nor the students were prepared for this challenge, adapting the means and techniques to the time available, so they adapted on the fly using the materials and knowledge they both had.

With the main idea of getting to know the ideas expressed by the students, one of the actors of education, the application of this objective test was carried out, finding a variety of answers and ideas, with results that present a vision from within the training process itself, some coincide, others do not, with what was found in different national and international reports; they can indicate in the context in which this research was developed, what was the student's perception of online education during the pandemic, compared to previous face-to-face education.

The survey applied has the characteristic that the same questioning is carried out, but in online education (odd questions) and face-to-face education (even questions), also grouped into 4 sectors of interest for this research: Attitudes (questions 1 to 14), Use of tools (questions 15 to 28), Problems when studying during the pandemic (questions 29 to 38) and exploration of face-to-face education (questions 39 to 45).

The responses of 192 surveys were evaluated, and in order to analyse the trend of the data obtained, graphs were made of the odd and even questions, and graph 1 shows the averages of the odd responses:

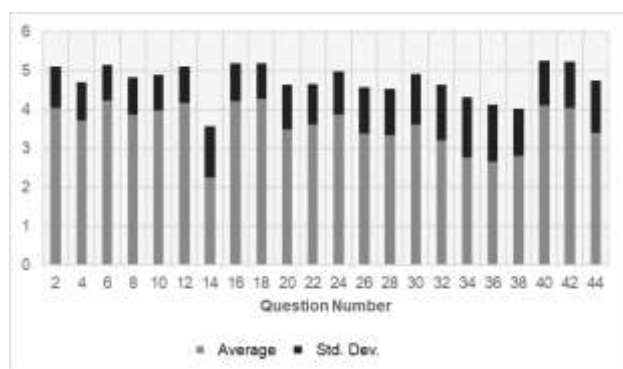


**Graph 1** Averages of responses to the odd-numbered questions in the validated survey  
*Own Elaboration*

The graph shows the average results of the answers given, in the bars that represent the attitudes towards the pandemic (1 to 13), it can be seen that the highest acceptance was for question 5, to question 1 the answer applies to the option neither agree nor disagree, marking a neutral tendency towards online education.

In the Use of ICT in education (15 to 27), the highest acceptance is found towards "totally agree", i.e. they accept the use of basic programmes, information search engines, e-mail, virtual libraries, Facebook-type networks and virtual platforms. In terms of problems when studying online (29 to 37), the bars clearly show a tendency to "disagree", indicating that there is little problem to have internet at home, they can have a PC, use of microphones without problem, work does not represent a problem to study online, in question 37 they accept, giving the highest score for "agree" that the use and abuse of social networks have been one of the main distractions for learning, finally, in exploration of face-to-face education, the highest score was in "agree" for the acceptance that face-to-face education has a fundamental role in learning, the other answers are in values close to "agree", which represents a higher acceptance for face-to-face education compared to online education, they feel little satisfied by the online education they are receiving and that online education limits learning situations.

Graph 2 shows the average data for the paired questions, all of which are similar to the previous graph, except that the questions related to face-to-face education are referenced here.



**Graph 2** Averages of the answers to the paired questions of the validated survey  
*Own elaboration*

Although the questions were worded the same, the focus given in these questions was to question face-to-face education, it was found in attitudes (from 2 to 14) that most of the answers were closer to an average value for the answer "agree", in this case, students accept face-to-face education fostering their interest in teaching and learning processes, the use of Tics by teachers in face-to-face education, and its improvement, which could be interpreted as a manifestation of interest in face-to-face teaching.

From this group the only answer close to 2 ("disagree"), is further underlining that face-to-face education enables them to learn properly; in Use of ICT in education, the 2 questions with the highest score and close to "agree", show that in face-to-face education are also used basic software and information search engines, virtual libraries, different means of virtual communication such as e-mails, forums, etc., and virtual platforms such as Moodle and Moodle and virtual platforms such as Moodle and Classroom. When looking at the answers given to the group of Problems when studying online (30 to 38), the students answered somewhat differently to the same questions but referring to online education, their first answers (30 and 32) are quite close to the value of 4 (agree) emphasising that there are problems due to the failure of the internet,

The last question in this group (question 34 and 36), their answers are close to an average score of "neither agree nor disagree", indicating that there are no problems with the use of a PC at home, nor with internet failures due to the locality where they live, the last question in this group (question 38) had an answer tending to a value of 3 on the Likert scale, unlike the answer given in the online education situation (close to "disagree"), remembering that this is the question that asks the student to answer "whether the use and abuse of social networks is a detriment to education", the answer given in the case of the directionality to online education varied with respect to the answers given in the face-to-face education approach, in fact there is significant statistical difference, and suggests that when the student is in face-to-face classes, he/she does not spend much of his/her time in social interactions, through social networks.

In the last group exploring face-to-face education, all 3 questions were answered with values close to 4, referring to a greater acceptance of face-to-face education, and a slight tendency towards a degree of discomfort with online learning in a home environment.

The following table shows the average results analysed, grouped into the items of analysis and also included the median, as a measure of central tendency, which optionally allows for an easier interpretation of results.

Survey question	Media	Standard deviation	Median
1	3.047	0.0857	3
2	4.067	0.0745	4
3	3.771	0.0704	4
4	3.724	0.0701	4
5	4.240	0.0710	5
6	4.224	0.0672	4
7	3.708	0.0818	4
8	3.859	0.0703	4
9	3.547	0.0838	4
10	3.974	0.0602	4
11	3.922	0.0788	4
12	4.161	0.0677	4
13	3.521	0.0982	4
14	2.245	0.0956	2
15	4.526	0.0644	5
16	4.203	0.0710	4
17	4.495	0.0622	5
18	4.276	0.0654	5
19	4.500	0.0652	5
20	3.479	0.0839	4
21	3.703	0.0852	4
22	3.609	0.0763	4
23	4.240	0.0751	5
24	3.875	0.0804	4
25	3.953	0.0786	4
26	3.391	0.0854	3
27	4.286	0.0663	5
28	3.344	0.0854	3
29	2.490	0.0877	3
30	3.604	0.0946	4
31	2.391	0.0985	2
32	3.219	0.1022	3
33	2.464	0.0895	2
34	2.771	0.1122	3
35	2.542	0.0934	2
36	2.661	0.1056	2
37	3.745	0.0878	4
38	2.807	0.0874	3
39	4.406	0.0709	5
40	4.104	0.0826	5
41	4.047	0.0846	5
42	4.042	0.0864	5
43	3.568	0.0950	4
44	3.406	0.0972	3
45	3.719	0.0961	4

**Table 1** Descriptive data of the variables. Attitudes (1-14, blue shading), Use of ICTs in education (15-28, orange shading), Problems in online education (29-38, green shading) and Exploration of face-to-face education (39-45, no shading) were grouped together education (39 to 45, no shading)

*Own Elaboration*

Both graphs 1 and 2 and table 1 show that there is no particular trend in the averages of the answers, the answer with the highest score (mean=4.526), with an approach to "strongly agree" was question 15: "In online education I frequently use basic programmes" and the same question applied to face-to-face education also had the lowest score (mean=2.245), "disagree" and both in the sense that they were applied are corresponding, the answers are congruent in the sense of online and face-to-face education.

Analysis of variance was also applied to find out whether or not there are statistically significant differences between the answers given to each pair of corresponding questions, i.e. questions 1 and 2, 3 and 4, 5 and 6 were compared and so each pair relating the same idea, to perform this analysis of variance it was necessary to determine the condition of normality, applying the Kolmogorov Smirnov test, the non-existence of normality between the answers given by the students was demonstrated.

Given the lack of normality in the answers to each of the questions, corroborated by the aforementioned test, the analysis of variance was applied by means of Spearman's coefficient, which showed that there is a significant difference between questions 1 and 2 and between 13 and 14; in all the other questions there was no significant difference. The interpretation for the lack of correlation between questions 1 and 2 and between 13 and 14 may be due to the fact that the student has had difficulties in defining a tendency of acceptance regarding online and face-to-face education, the answers being very varied, showing a certain degree of confusion and non-conformity and it is not clear in their position as students that they have achieved the required learning; it could also be interpreted as the factor that increased the drop-out rate and not the failure rate that occurred in most of the HEIs.

It is notable that, in the face of the crisis caused by the pandemic, students seem to be more aware of their strengths, of their potential to learn and achieve the competences, initially each one adapted the virtual platform they knew or had access to, with the resources they had at hand, and this is precisely what is highlighted in the results of this survey, the ability to adapt, and in the face of the return to face-to-face classes, they are certainly rethinking this interesting expectation of greater interaction and teacher-student communication, For this reason, education today must take a responsible, appropriate, tolerant approach, but without ceasing to be objective, certain, that allows better parameters to be established for measuring the competences achieved, placing more emphasis on seeking better forms of evaluation for an emerging education, which demonstrates to students and society that studying online is as objective and valid as face-to-face education.

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## Conclusions

The results of this preliminary research show that the adaptation of each stakeholder in the educational process, be it teacher, student or student, according to their own interests, has nuanced the learning required in higher education, which, unlike other levels of education, is subject to a particular type of labour, economic and social demands.

These particularities caused technological and pedagogical challenges in the process of implementing and operating online education, especially in groups of students whose reference point is face-to-face education.

It can be observed that the fundamental element of the online educational process, communication, was hindered by different situations, one of them being the economic aspect, as the student lacks the monetary resources to implement a communication model that is effective to the institutional requirements and that the group's teacher demands.

On the other hand, socially, the student's feeling of isolation at home and his absence on the school campus, where personal interaction with his generational peers takes place, had an impact on performance.

As for the aspect of effectiveness in the use of time, it is evident from the responses that it was made more efficient, as the time spent travelling from home to school was drastically reduced, or at best not used at all.

However, it was not used in the number of hours devoted to study, but perhaps not in leisure time or the intensive use of social networks.

Regarding the academic situation, some consider that it was positive to learning, however, a significant part estimated that learning was not as expected, mainly explained by the pedagogical character that occurs in the dynamic interaction between peers, and that develop the group learning process, but due to the nature of online education can not be established.

In some cases, these factors have led to student desertion, especially in groups of students who, because of their economic and social status, belong to certain urban, semi-urban and out-of-town groups, and who, in order to meet their basic needs for economic survival, put aside their interest in education and a long-term professional career, concentrating instead on activities that involve the here and now.

As a consequence of these factors, there is an indistinct appreciation among students of the benefits of distance education compared to face-to-face education, although for teachers this feeling is not accurate, as they state that there are deficiencies in the academic training of students during the pandemic.

As a future research, it would be worthwhile to emphasise the different appreciations that teachers and students of diametrically opposed specialisations may have had, given that some of these specialisations, due to their own structure, may be more easily adapted to online education than others.

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