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Opportunities and barriers of virtual education: conditioning factors in the perception of the level of satisfaction of educational actors

Oportunidades y barreras de la educación virtual: condicionantes de la percepción del nivel de satisfacción de los actores educativos

虚拟教育的机遇和障碍：教育行为者满意度感知的决定因素

Возможности и барьеры виртуального образования: обуславливающие факторы в восприятии уровня удовлетворенности участников образовательного процесса

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Abstract

This study addresses virtual education in the context of the pandemic, with the aim of analysing the opportunities, barriers and level of satisfaction of educational actors with this mode of study. The approach is quantitative descriptive with a non-experimental, cross-sectional design. Data were collected through a questionnaire and applied to 10 educational institutions. Quota sampling was carried out, with a sample of 410 subjects. The results showed that communication, teacher performance and the management of virtual learning environments are basic conditions for the implementation of virtual education; student-centred teaching, the likelihood of studying at any time and place, access to teaching aids and diverse methodologies were established as advantages. Disadvantages include access problems, poor internet connection, difficulties in assimilating change and the pace of work, lack of skills to manage virtual classrooms. The educational actors express a medium level of satisfaction with this mode of study, with significant differences between users and servers. It is concluded that virtual education presents a series of opportunities and barriers that condition the level of satisfaction.

Keywords: learning, education, teaching, satisfaction, new technologies.

Resumen

Este estudio aborda la educación virtual en el contexto de la pandemia, cuyo objetivo es analizar las oportunidades, barreras y nivel de satisfacción de los actores educativos, frente a esta modalidad de estudio. El enfoque es cuantitativo descriptivo con diseño no experimental-transversal. Los datos se recogieron mediante un cuestionario y se aplicó a 10 instituciones educativas. Se realizó un muestreo por cuotas, con una muestra de 410 sujetos. Los resultados mostraron que la comunicación, el desempeño docente y la gestión de ambientes virtuales de aprendizaje son condiciones básicas para la implementación de la educación virtual; se establecieron como ventajas la enseñanza centrada en los estudiantes, la probabilidad de estudiar en cualquier tiempo y lugar, el acceso a ayudas didácticas y a diversas metodologías. Mientras que entre las desventajas destacan problemas de acceso, mala conexión a internet, dificultades para asimilar el cambio y el ritmo de trabajo, la falta de competencias para gestionar las aulas virtuales. Los actores educativos expresan un nivel medio de satisfacción respecto a esta modalidad de estudio registrándose diferencias significativas entre usuarios y servidores. Se concluye que la educación virtual presenta una serie de oportunidades y barreras que condicionan el nivel de satisfacción.

Palabras clave: aprendizaje, educación, enseñanza, satisfacción, nuevas tecnologías.

概要

本研究涉及疫情背景下的虚拟教育，其目的是分析教育参与者面对这种研究方式的机会、障碍和满意度。我们使用定量描述的非实验横向设计的研究方法。数据是通过问卷收集的，并应用于 10 个教育机构。研究进行了配额抽样，样本为 410 名受试者。结果表明，虚拟学习环境的交流、教学绩效和管理是实施虚拟教育的基本条件；以学生为中心的教学、随时随地学习的可能性、获得教具和各种方法论被确立为优势。缺点包括访问问题、互联网连接不良、难以适应变化和工作节奏、缺乏管理虚拟教室的技能。教育参与者对这种学习方式表达了中等水平的满意度，表明用户和服务器之间存在显着差异。得出的结论是，虚拟教育提出了一系列影响满意度的机会和障碍。

关键词：学习、教育、教学、满意度、新技术。

Аннотация

Данное исследование посвящено виртуальному образованию в контексте пандемии, цель которого - проанализировать возможности, барьеры и уровень удовлетворенности участников образовательного процесса этим способом обучения. Подход - количественный описательный, неэкспериментальный, кросс-секционный. Данные были собраны с помощью анкеты и применены к 10 образовательным учреждениям. Была проведена квотная выборка, составившая 410 человек. Результаты показали, что коммуникация, эффективность преподавания и управление виртуальной учебной средой являются основными условиями для внедрения виртуального образования; в качестве преимуществ были определены преподавание, ориентированное на учащихся, возможность обучения в любое время и в любом месте, доступ к дидактическим пособиям и разнообразным методикам. К недостаткам относятся проблемы доступа, плохое подключение к Интернету, трудности в освоении преобразований и темпа работы, отсутствие навыков управления виртуальными классами. Участники образовательного процесса выражают средний уровень удовлетворенности этим способом обучения, со значительными различиями между пользователями и серверами. Делается вывод, что виртуальное образование представляет ряд возможностей и барьеров, которые обуславливают уровень удовлетворенности.

Ключевые слова: обучение, образование, преподавание, удовлетворенность, новые технологии.

Introduction

The pandemic forced the education system to migrate to ICT-based remote education in the face of the impossibility of face-to-face teaching. However, the virtualisation process is more complex than expected, as the digital divide and social inequalities mean that neither the population nor the educational institutions have the technological infrastructure and the necessary conditions to enter into this process. Given this reality, Gómez and Escobar (2021) state that the virtual mode of education has exposed the shortcomings of education systems, especially in terms of social inequality gaps and digital inequalities, demonstrating that education during confinement is a luxury that is not available to all.

The current reality in the world and specifically in Latin America begins in March 2020 because of COVID-19, causing a series of preventive measures to be taken, including confinement, in most countries. As a result, face-to-face social, economic, and academic activities were suspended, forcing traditional education to move quickly and adapt to virtual education, which brought with it challenges in terms of updating methods, approaches and support tools in order to present quality educational programmes.

The United Nations Educational, Scientific and Cultural Organisation (UNESCO, 2020) has launched the Global Coalition for Education, which aims to provide children and youth with opportunities to access education during the time of unplanned confinement and social isolation, with no educational background. Unesco, on its website, notes that the health emergency caused by COVID-19 is a large-scale impact event and therefore constitutes a state of crisis for education. This leads to rethinking teaching-learning processes, looking for opportunities and overcoming barriers to their development in the face of the pandemic. In March 2020, the Ministry of Education of Ecuador, through the Minister of Education, launched an educational contingency

plan, which describes the lines of action for teachers, principals, rectors, members of the DECE (Student Council Department) and the UDAI (District Inclusion Support Units) to continue school activities to complete the current school year.

However, with the start of the new school term, the student population was unable to return to the classroom because of the pandemic, educational institutions were forced to look for different mechanisms to be able to offer educational services, so educational platforms, technological resources, tele-education, and virtual education mechanisms were implemented to allow them to continue the training process without interruption.

From the analysis of the description of this scenario, a series of questions arise that seek answers in the medium and long term: *What are the opportunities and barriers to the development of virtual education? What are the basic conditions that educational institutions possess for the implementation of online education as a mode of study? What are the advantages and disadvantages of virtual education? What is the level of satisfaction of educational stakeholders with this mode of education?*

There is research on this issue that allows the problem to be placed in a scientific context. Salgado's study (2021) considers that some of the barriers that virtual education must face are related to student access to technologies, teacher training to manage online learning, and the organisation of virtual environments. He also points to the possibility of expanding the academic offer and highlights the students' interest in this form of education as opportunities.

On the other hand, research by Gómez and Escobar (2021) showed that virtual education increases the digital divide, threatening equal access to education. Furthermore, it concludes that education during the pandemic is feasible for those with sufficient economic, social and technological conditions. Also, the work of Nieto (2012), explains that virtual education, due to its methodological versatility and the various forms of application, has great educational potential, enabling access to education for socially forgotten groups, overcoming barriers of space and time, in such a way that it improves the quality of education.

Finally, Parra's (2009) study revealed that virtual education in the university context is a significant factor of change and innovation in society, creating equal opportunities for people. It also points out that in order to achieve this goal, certain conditions other than face-to-face education must be met.

From the background analysis it can be established that there are few studies that address the advantages and disadvantages of virtual education in basic education, most of the studies are oriented towards higher education, however, it is striking that before the pandemic the virtual mode of education was already projected as an alternative to traditional education and a way to massify education and offer access to it.

In Spanish-speaking countries, the meaning of virtual education refers to the process of teaching and learning a series of contents by overcoming space-time barriers between students and teachers, through information and communication technologies (ICT), which facilitate interaction between members of a community (Salgado, 2021; Tabatabai, 2020). In English-speaking countries, it is equated with so-called online learning. It is also common in Latin America to make a distinction between the terms distance education and virtual education. According to Salgado (2021), distance education was born with the industrial revolution, because with the appearance of radio and television during the 19th century, these mass consumer media were used to

bring education to the home. However, the virtual mode of education is based on the use of ICT, with the internet as the basis for development (Reynoso et al., 2020).

Virtual education is characterised by the physical distance between teacher and student, with the opportunity for students to study autonomously by regulating the time and pace of work. However, it is based on an institution that, through human talent, plans, outlines, creates resources, monitors, develops, evaluates and accredits learning (García, 2021). Therefore, communication processes, content, technological resources and tools, such as platforms for managing learning, together with the competences of the teaching staff, are some of the basic conditions for virtualising education.

In short, "virtual education can be understood as an intentional, planned and organised process in which learning experiences are promoted through dialogue mediated by information and communication technologies" (Salgado, 2021, p. 11). Virtual education promotes interaction, improves learning and the acquisition of competences, responds to educational objectives, stimulates the development of thought, promotes autonomy and lifelong learning, aspects that can be considered as some of the advantages of this educational modality (Aguilar, 2020).

Virtual education requires the use of ICT, as it promotes tools or systems that enhance traditional face-to-face teaching, facilitating interaction between participants in the process. The technological innovations that can be harnessed in teaching, all the applications, programmers, materials and information managers, as well as the availability of resources that technology offers today, are seen as advantages in this form of education.

Virtual education relies on information technologies as a fundamental tool in the educational process. Consequently, like any new proposal and incursion into a new development context, it requires time to adapt to change and patience to assimilate the errors that may arise during implementation, which become potential disadvantages that have an impact on learning outcomes and user satisfaction.

According to Sanmartín et al. (2020), the use of the internet and social networks has become widespread during confinement, with adolescents as the main users, who say they feel tired by the use and abuse of digital environments and, despite this, the appreciation of ICTs is satisfactory, emphasizing that they are fundamental for social interaction and as the main support for online education. By virtue of this, Pacheco and Infante (2020); MINEDUC (2020); UNESCO (2020), consider that ICT are tools that, when used appropriately, contribute positively to academic performance, which is why they play a predominant role in the virtual mode of education.

Another aspect that is important to know is the degree of satisfaction of the educational actors in relation to this mode of study. Satisfaction is manifested as the attitude that an individual assumes towards a certain situation or event, that is, it is the way in which someone values their activities or experience in comparison with the expectations of what they hope to achieve, as a consequence of certain conditioning factors, whether psychological or relating to the level of motivation aimed at certain goals or the search for well-being (Cantón & Téllez, 2016; Franco et al., 2019; Guerrero et al., 2018; Limaymanta, 2019; Muñoz & López, 2018).

In other words, satisfaction is defined as a valuation indicator that combines attitudes and feelings that allow a positive judgement of the quality of the activities, experiences and results of the educational process (Reynoso et al., 2020). The satisfaction of the educational actors responds to various factors: the experience lived during the

process, the support and accompaniment, the facilities of access to the virtual learning environment. the design and management of virtual classrooms, as well as the organization of information and resources subject to the technological infrastructure of educational institutions; in other words, there is a multiplicity of indicators that determine the satisfaction of those involved in the virtual teaching-learning process (Reynoso et al., 2020).

The importance of the study is justified by the topicality of the subject, which has aroused the interest of researchers and the scientific community in seeking information to understand a phenomenon that before the pandemic was seen as an alternative option for access to education and that today, due to the circumstances, is presented as an opportunity to provide continuity to the educational process.

It also makes a theoretical contribution to the field of knowledge, as it will define the opportunities and barriers of virtual education, as well as the level of satisfaction from the perspective of the educational actors. This information will allow the generation of actions and the search for solutions to the problems of the current reality that guarantee the right and universal access to education for the population, through formal or non-formal modalities, regardless of their economic or social situation.

In relation to the above, the aim of the study is to analyse the opportunities, barriers and level of satisfaction of educational actors in the development of virtual education as a mode of study.

Method

The study responds to a quantitative approach because the study phenomenon is described through numerical data (Hernández & Mendoza, 2018). The design is non-experimental cross-sectional, as the variables were not manipulated and it was carried out over a defined period of time; the main characteristic of this design is to analyse a phenomenon as it occurs in its natural state. The type of research is descriptive in scope, as it aims to specify important characteristics and features of the phenomenon analysed (Hernández & Mendoza, 2018).

Regarding the population, Hernández and Mendoza (2018), mention that it is a set of all cases that match observable characteristics in a particular place or time. According to this, 10 Educational Units of the 23D02 district of the city of Santo Domingo - Ecuador were taken as the population. This type of sampling consists of selecting quotas according to the proportion of certain variables in the population. The sample was established at a total of 410 subjects, of which a quota of 15 students (150 students), 15 parents (150 parents), 10 teachers (100 teachers) and 1 manager (10 managers) were selected for each institution.

The information was collected by means of a questionnaire that made it possible to identify the basic conditions required by the educational centers to implement virtual education; it also inquired about the advantages and disadvantages in the implementation of this educational modality, for these first two purposes a nominal scale (Yes/No) was used; also, it was asked to evaluate the level of satisfaction by means of a five-level Likert scale: *Totally Dissatisfied (TI), Dissatisfied (I), Moderately Satisfied (MS), Satisfied (S) and Totally Satisfied (TS); thus comprehensively responding to the objective of the study.* These instruments were validated by expert criteria and subjected to internal

validity tests using Cronbach's Alpha coefficient, giving a value of .81, guaranteeing greater objectivity and validity in the results.

The data analysis techniques were based on descriptive statistics, which made it possible to ascertain the trends of the variables studied, the results of which were expressed in frequencies and percentages, as well as the statistics of the sum of the scores that made it possible to calculate the averages of the different quotas that made up the sample. Similarly, inferential statistics were used to apply the Student's t-test for independent samples, with the aim of establishing the level of satisfaction and finding out if there are significant differences between the means of the groups that make up the sample. This work was carried out with the support of the Statistical Package for Social Sciences (SPSS), version 25, which allowed the results to be structured and organised for their subsequent analysis and interpretation.

Results

Initially, the basic conditions that educational institutions have to implement virtual education as a mode of study were identified.

Table 1

Basic conditions of educational institutions

Indicators	Yes		No	
	F	%	F	%
Multimedia resources and tools	246	60	164	40
Teaching capacity and performance	290	70.73	120	29.27
Communication between users	319	77.80	91	22.20
Organisation of the virtual environment	287	70.00	123	30.00

When analysing the basic conditions for implementing virtual education, it was possible to establish that according to the criteria of the sample investigated, 77.8% indicated that they are related to communication, 70.7% to the performance capacity of the teacher in the management of virtual environments and 70% stated that they respond to the capacity of the institutions to organise virtual environments. However, it is striking that the resources indicator, which reached 60%, was not considered as one of the first conditions for implementing this mode of education. This is because the institution provides only some of the necessary resources and many of them are acquired at the teacher's own expense.

Based on the above analysis, it is evident that the transition from face-to-face to virtuality took everyone by surprise, specifically the education sector, which is why the conditions that educational institutions have to enter into the process of virtualisation of education are not the most favourable, this is reflected in the precarious communication channels that institutions have to interact with members of the community, which even in face-to-face scenarios show deficiencies; in the same way, another condition that is substantial for implementing virtual education is the competences that teach-

ers possess to manage virtual environments, an aspect that is directly proportional to the performance of teachers in this mode of study.

The advantages and disadvantages of the implementation of this study modality were also established.

Table 2

Advantages of e-learning as a study modality

Indicators	Yes		No	
	F	%	F	%
Possibility to study at any time and place	329	80.24	81	19.76
Access to teaching and audiovisual aids	315	76.83	95	23.17
Availability of various strategies and methodologies	309	75.37	101	24.63
Promotes collaborative work among students	306	74.63	38	25.37
Education focuses on achieving goals	342	83.41	38	16.59
Global average		78.10		21.90

When analysing the advantages of virtual education, 80.24% stated that these include the possibility for students to access their studies anywhere and at any time, as they only need Internet connectivity; 76.83% stated that another of the advantages refers to the didactic and audiovisual aids to which students and teachers have access, as they increase the quality of learning and teaching; likewise, 75.37% stated that one of the advantages lies in the availability of access to various strategies and methodologies that make the teaching-learning process more dynamic; 83.41% stated that another advantage is that it allows students to focus on the learning process. 37% indicate that one of the advantages lies in the availability of access to various strategies and methodologies that make the teaching-learning process more dynamic; 83.41% state that another advantage is that it allows teaching to be focused on the achievement of educational objectives; finally, 74.63% express that the advantages are associated with the possibility of promoting collaborative work among students.

Table 3

Disadvantages of e-learning as a mode of study

Indicators	Yes		No	
	F	%	F	%
Difficulties of access due to technological deficiencies	330	80.49	80	19.51
Internet connection problems, equipment failures	354	86.34	56	13.66
Requires more time by the teacher	305	74.39	105	25.61
Difficulties in assimilating change and keeping pace	312	76.10	98	23.90
Lack of skills to manage learning	293	71.46	117	28.54

Lack of motivation on the part of the teacher and student	307	74.88	103	25.12
Global average		77.28		21

Continuing with this analysis, it was found that 86.34% of the respondents stated that connectivity problems, equipment, and work material deficiencies are the main disadvantages of virtual education and that they can cause delays and interruptions in the learning process; likewise, 80. 49% mention that another important disadvantage refers to the difficulties in accessing the virtual modality due to technological deficiencies or the quality of the equipment; in the same vein, 76.10% recognise that among the disadvantages are the difficulties in assimilating the change and keeping up with the pace of work in the new teaching modality; on the other hand, 74. 88% point out as a disadvantage the lack of motivation on the part of the teacher and the student, which is a negative factor in the learning process; in the same way, 74. 39% believe that another disadvantage is due to the greater investment of time required by the teaching staff to prepare the classes and the work material, as the didactic-methodological design and structure of the class is a substantial aspect in the virtual environment, so that the preparation and design at a technological level, as well as the selection and preparation of the resources and work material is more demanding and involves more time, compared to face-to-face classes.

In short, 71.46% believe that a disadvantage is the lack of competences to manage virtual environments and facilitate student learning; this aspect is fundamental within the virtual education process, as the digital competences of the educational actors determine the efficiency and quality of the processes and are decisive in achieving results in this mode of education.

Finally, the level of satisfaction of students, parents, teachers and managers with virtual education as a mode of study was evaluated.

Table 4

Description of the level of satisfaction overall and by groups

Type of educational actor TI		Level of satisfaction						
		I	NTI	MS	S	TS	NTS	
Students	F	25	10	35	14	88	13	101
	%	16.7	6.7	23.4	9.3	58.7	8.7	67.4
Parents	F	27	15	42	9	81	18	99
	%	18	10	28	6	54	12	66
Teachers	F	35	30	65	12	19	4	23
	%	35	30	65	12	19	4	23
Managers	F	4	2	6	0	3	1	4
	%	40	20	60	0	30	10	40

Total	F	91	57	148	35	191	36	227
	%	22.2	13.9	36.1	8.5	46.6	8.8	55.4

Note. TI = Totally Dissatisfied, I = Dissatisfied, NTI = Total Level of Dissatisfaction; MS = Moderately Satisfied; S = Satisfied, TS = Totally Satisfied; NTS = Total Level of Satisfaction.

It can be observed that the level of student satisfaction reaches 67.4%; parents have a similar level representing 66%; while teachers and managers express low levels of satisfaction between 23% and 40%, respectively. The overall satisfaction level of the sample studied reached 55.4%; a percentage that reflects a medium level of satisfaction with this mode of study.

Tabla 5

Average level of satisfaction in each group

Level of satisfaction	Type of educational actor	Mean	N	Standard deviation
Educational users	Students	3.36	150	1.24
	Parents	3.32	150	1.32
	Total	3.34	300	1.28
Educational servers	Teachers	2.27	100	1.23
	Managers	2.50	10	1.58
	Total	2.29	110	1.26
	Total of the sample	3.05	410	1.35

Educational users (students and parents) have a mean of 3.34 in terms of satisfaction with the virtual mode of education, with a standard deviation of 1.28, from a random sample of 300 subjects. These numbers produce a standard error of the mean of .074. This means that, on average, a student or parent has a medium or moderate level of satisfaction.

In contrast, educational servants (teachers and managers), exhibit a mean of 2.29 on the level of satisfaction in relation to virtual education, with a standard deviation of 1.26, out of a random sample of 110 individuals. These figures represent a standard error of the mean equal to .12. Therefore, on average, a teacher or manager exhibits a low level of satisfaction.

On the other hand, the overall mean of the unsegmented sample is equal to 3.05 in relation to the overall level of satisfaction, with a standard deviation of 1.35, with respect to a sample of 410 individuals. These data give a standard error of .067, consequently, on average, a subject who is part of the educational actors has an average level of satisfaction with a downward trend, which coincides with the global analysis of the average percentages (55.4%) expressing an average level of satisfaction of the sample studied.

When analysing the averages for users and educational servants, it can be established that there is a difference of 1.05 between the mean scores, reflecting a significant dif-

ference in the level of satisfaction between the different groups, since, while students and parents show a medium level of satisfaction, teachers and managers, on the other hand, register a low level, although the overall level is medium.

In order to corroborate the results, found, the T-test for independent samples was applied.

Table 6

Test of independent samples

		Levene Test of Equal Variances		Test t for Equal Means						
		F	Sig.	t	gl	Sig. (bilateral)	Mean difference	Mean difference Standard error difference	95% of difference confidence interval	
									Lower	Upper
Level of satisfaction	Equal variances assumed	.001	.98	7.37	408	.000	1.05	.14	.77	1.33
	No equal variances are assumed			7.41	196.25	.000	1.05	.14	.77	1.33

Levene's test yields an F-value equal to .001 and a p-value of .98 which is greater than .05, these data indicate that the variances of the groups are not significantly different, or in other words the variances of the groups are equal.
It is observed that the educational users of General Basic Education have better levels of satisfaction, as they are moderately satisfied with the educational services they receive in virtual education (M = 3.34, SD = 1.28); compared to those who offer educational services in this modality of education (M = 2.29, SD = 1.29), t (408 gl) = 7.37.

The t-test statistic is equal to 7.37, with 408 degrees of freedom and an associated probability or p-value equal to .000, which is less than .05, these data show that there are significant differences between the means of the groups, concluding that educational users (students and parents) have higher levels of satisfaction compared to educational servers (teachers and managers), i.e. students and parents are more satisfied with the virtual mode of education and its application.

In addition, the difference in the means of the satisfaction levels between the two groups is 1.05, with a 95% confidence interval ranging from .77 to 1.33, in this interval the zero is not included, indicating that the means of these groups are not equal.

These differences can be explained through the roles that each educational actor assumes within the process of e-learning. In the case of parents and students, they play the role of consumers because they are the ones who receive the service from the comfort of their homes, adjusting to the conditions of time and space available, where mistakes made do not require major concern, as it is always possible to correct them

or receive support and feedback. Similarly, while they have responsibilities and commitments to fulfil within the process, they are not as pressured by the results and their consequences, as the regulations are more flexible with users.

On the other hand, the demands on teachers and managers are greater, as they play the role of producers, i.e. they are responsible for providing the service, which must meet certain quality standards and a level of efficiency that is not negotiable, where errors have more noticeable effects, so the pressure is different, with the aggravating factor that the lack of experience of teachers and managers to work in these environments is a determining factor in the satisfaction of users and the servers themselves. Consequently, there are greater demands on teachers and managers in the planning, management, execution, and evaluation of the process, whose actions must respond to the demands not only of the educational community, but also of the ministry that oversees the results obtained.

Discussion

Initially, the basic conditions that educational institutions have to implement virtual education as a mode of study were identified. These conditions are mainly related to communication and the mechanisms used for interaction between teachers and students, which is in line with Sanipatin (2017); Cifuentes (2020) who point out that aspects related to communication are fundamental to ensure interactivity between teachers and students during the implementation of classes in the virtual modality. Likewise, Uzcátegui and Albarrán (2020) "reveal difficulties in communicating with students, planning and evaluating activities and the absence of institutional guidelines" (p. 43). However, teaching competences and performance are considered as the second basic condition for implementing virtual education; a result that coincides with that stated by the Ministry of Education of Ecuador (MINEDUC, 2020), which declares that teaching performance is a basic condition that allows for promoting didactic and pedagogical actions that favour teaching processes in the virtual education modality.

Another condition is the organisation of virtual learning environments, which is related to the organisation of information, the layout and distribution of teaching resources in virtual classrooms, which conditions learning and affects the development of online classes. In this regard, Clark (cited in Pacheco and Infante, 2020) points out that "a student learning in a technology-based environment, the difference in learning outcomes achieved is mainly due to the method used or the design and development of the material" (pp. 87-88). Likewise, resources represent a basic condition in the development of virtual education, however, they may take a back seat, this is because institutions provide some of them and many are managed by the teachers themselves; results that differ from the findings of the study by Díaz et al. (2017) who showed that resources are virtual educational content prepared for teachers, students and the entire educational community, considered as a support tool and pedagogical support for the learning process and not a basic condition for implementing virtual education.

On the other hand, when establishing the advantages and disadvantages in the implementation of the virtual mode of education, it was established that the advantages of this mode include the potential to overcome time and space barriers and the possibility of accessing multiple resources and strategies that favour the development of competences and favour learning, which coincides with Duran (2015) who states that

the virtual mode of education is a way of improving both the competences and the learning outcomes of students.

In the same way, Aguilar (2020) considers that the advantages of virtual education are the possibility for teachers to develop new skills and knowledge, interact almost in real time, reduce costs, and overcome the obstacles of travel, distance, and the use of traditional educational methods, due to the speed at which changes and innovations occur, although these aspects do not guarantee the quality of education, as there is a risk of continuing to do the same thing but with the use of technology.

In view of the above, virtual education has a series of disadvantages such as access difficulties, technological deficiencies, poor internet connectivity, equipment failures, applications and work resources, which can cause delays and shortcomings in the teaching-learning process; in this respect, Uzcátegui and Albarrán (2020) reveal that communication problems, the lack of teaching planning, the type of assessment used and the lack of guidelines to guide the process are the main disadvantages of this modality. In addition, it demands more time from the teaching staff to prepare the class, as Cabero (2006) states, virtual education requires more time investment from the teacher compared to face-to-face classes, as it implies a greater design of the class at the curricular level and a higher quality of resources and materials for the development of the class. Added to this is the lack of teacher motivation, which is a negative aspect with direct repercussions on the teaching-learning process, so assimilating changes and adapting to the pace of work in this mode of study can become a disadvantage that affects the performance of teachers and students (Reynoso et al., 2020).

It should also be noted that the digital divide and social inequalities constitute a real disadvantage for the implementation of virtual education, however, the competences to cope in virtual learning environments, both for students and teachers, can be decisive in adapting to change and being able to keep up with the pace of work in these circumstances; furthermore, the success or failure of such implementation and the results obtained depend on the quality of the performance of those involved in the educational process. In this regard, Gómez and Escobar (2021) point out that "educational subjects, in times of pandemic, are not in equal conditions to access virtual education" (p. 153); since geographical location, economic conditions and technological deficiencies, added to the lack of training and experience in the use of ICTs, are obstacles that constitute real disadvantages faced by virtual education.

In short, it was possible to establish the level of satisfaction with virtual education from the point of view of the educational actors and agents, recording an overall medium level of satisfaction. This result is in line with Barrutia et al. (2021), who state that students have a moderate level of satisfaction with online classes. Furthermore, they explain that this is due to the deficit that teachers have with regard to the use and management of technologies. This argument coincides with Sanmartín et al. (2020), who highlight that students judge teachers' digital skills to be deficient. In line with the above, the same authors highlight that the problems faced by students in continuing their education are related to the lack of training of teachers and their ability to perform online, and that these drawbacks are the ones that cause the greatest dissatisfaction among users.

Similarly, Prodanović and Gavranović (2021) express that the majority of students have an average level of satisfaction reflected in a fairly positive attitude towards e-learning. In contrast to the study by Sandoval (2021), when investigating the degree of satisfaction of a group of secondary school students with the virtual modality, he found that

the students had low levels of satisfaction, showing that they are not happy and that their preferences are inclined towards face-to-face classes rather than virtual classes.

On the other hand, Zambrano et al. (2020) conclude that the main dissatisfactions, linked to virtual education, respond to limitations in connectivity, the way of evaluating; deficiencies in the quality of practical tasks; and interactions between teachers and students that do not reach the required level of satisfaction (Zambrano, 2016). Similarly, continuing with the level of student satisfaction in the management of virtual classrooms, Suasti (2018) and Sanmartín et al. (2020) point out that most of them mention that they are not satisfied with the performance achieved in the different subjects, due to the difficulties they have to face, such as the limitations of network connectivity and the quality of the didactic interactions generated.

In relation to the level of parental satisfaction, Santos et al. (2020) mention that parents are less trained to support and participate in e-learning activities and that teachers have little training in digital skills, which makes it difficult to manage learning in this mode of study, aspects that affect the level of satisfaction.

Cabrera et al. (2021) state that parents' satisfaction with online education depends on the type of institution they belong to, i.e. the degree of satisfaction is significantly higher among parents whose children attend public schools compared to those whose children attend state institutions; moreover, families are more satisfied with the performance of teachers.

With regard to the level of satisfaction of teachers and managers, Reynoso et al. (2020) point out that, during the time spent teaching online, the teaching staff were generally moderately satisfied with the work carried out. Similarly, Alves et al. (2020) state that the majority of teachers working in the remote mode of education present levels of satisfaction with moderately positive feelings. In relation to the above, Condor (2020); Morales (2020) state that the backing and support that teachers receive from the students' families and also from the authorities and managers of the schools to which they belong, are the aspects that produce the greatest satisfaction among teachers.

The study has a methodological limitation related to the sample size, as the quotas selected, due to the pandemic, made it difficult to have a larger number of units of analysis, as well as availability and access to the participating subjects, so it is recommended that future studies consider a larger sample and a similar number for each of the quotas.

The possibility of continuing with future research in this area opens up a wide range of possibilities for understanding virtuality, especially as applied to the educational sphere, studies that could be aimed at investigating the impact of virtual education at different levels of education, the quality of learning in this modality, the competences that educational agents need to develop to facilitate learning in virtuality, among others.

The application of the results of the research in terms of the analysis carried out, makes clear the difficulties that education currently faces due to the change of modality, especially the challenges that teachers must face to continue with the updating and professional training in the management of new technologies and the possibility of exploiting these resources to improve the students' school performance; however, the real challenge lies in adapting to the new demands that this modality demands.

It can be determined that educational institutions have certain basic, minimum conditions necessary to implement virtual education; these conditions demand adequate

communication processes and channels, provision of a virtual learning environment, where resources and materials are organised and learning contents and methodologies are adequately managed. Similarly, Internet accessibility is built as the basis for the process; however, teachers' competences and ability to handle ICT-mediated virtual environments are decisive in implementing the teaching-learning process.

Virtual education opens up a wide range of opportunities related to its implementation, as this modality offers an alternative to continue with the educational process in the current conditions that the world is living, its impact is determined by the conditions that educational institutions have at a technological level, staff capacity to adapt to change and to carry out their functions. It also offers the possibility of overcoming the obstacles of time and space, the availability of a large number of resources, strategies and the use of ICTs, and requires the constant empowerment and training of educational actors.

The barriers encountered in virtual education include difficulties in accessing and connecting to the internet, greater time investment, lack of motivation and competences to manage learning, but mainly refer to the difficulties in adapting to change and keeping up with the pace of work required by this mode of education.

However, there are significant differences between those who make use of the educational services and those who offer them, as the demands and roles are different, as well as the conditions in which the process of virtualisation of education takes place and the lack of flexibility that the process demands, which conditions the degree of satisfaction of those involved.

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