



STUDENTS VIRTUALITY PERCEPTION IN PANDEMIC; TOWARDS THE NEW-U

*PERCEPCIÓN DE LOS ESTUDIANTES SOBRE LA VIRTUALIDAD EN PANDEMIA:
HACIA LA NUEVA U.*

FRANKLIN PINEDA TORRES¹

Cómo citar:

Pineda, F. (2021). Students virtuality perception in Pandemic; towards the new-U. *Vía Innova*, 8(1), 76-85. <https://doi.org/10.23850/2422068X.3707>

¹ Electronic engineer, Specialist in Automatic and Industrial Computer science of the Autonomía de Colombia University. Electronic and Computer Master engineer, Andes University. Ph.D.(c) in Education, Benito Juárez of Mexico. Fields of interest in Engineering Education, Robotics, Programming, and Industrial Automation. Currently professor and researcher of Autonomía de Colombia University.

RESUMEN Las Universidades de modalidad presencial con la llegada de la pandemia, tuvieron que recurrir muy rápidamente al formato virtual y clase remota para continuar con los procesos académicos. Se observa que el acople virtual desde las dimensiones comunicativa, pedagógica y tecnológica ha sido todo un reto para los actores dentro de la Universidad, entre ellos los estudiantes, quienes ven a la virtualidad como una herramienta valiosa; necesaria pero no suficiente, sustituto parcial educativo que requiere mejoras para la nueva realidad, tales como: interacción en clase, motivación, bienestar universitario, laboratorios, manejo de tiempos y actividades académicas entre las más importantes.

Palabras clave: Indicadores educativos, modalidad presencial, percepción, virtualidad.

ABSTRACT In order to continue the academic processes in the pandemic time, face-to-face universities had to resort very quickly to the virtual format and remote class. It is observed that the virtual coupling from the communicative, pedagogical and technological dimensions has been a challenge for the actors within the university, among them, the students who see virtuality as a valuable tool; virtuality is necessary but not sufficient, it is an educational partial substitute that requires improvements for the university new reality, such as: interaction in class, motivation, university well-being, laboratories, time management and academic activities among the most important.

Key words: Educational indicators, face-to-face modality, perception, virtuality.

1. INTRODUCCIÓN

As a result of the pandemic caused by COVID-19, nearly 1,200 million students around the world stopped attending face-to-face classes, according to UNESCO figures (Ruiz A., 2020). Face-to-face classes turned into virtual classes, and most universities, either from lack of technological infrastructure or lack of staff training, weren't well equipped for the change. From its main actors (Teachers-Students), who affirm that their work has increased considerably according to surveys by the Universidad de los Andes in Colombia (Restrepo E., Rodríguez T., 2020), a new model must be created to face the contingency of education in times of pandemic and beyond.

Since training, teachers have tried to transfer their face-to-face classes to remote communication platforms, having to confront a variety of issues such as: time, attendance and participation of the student in class; knowledge about the use of platforms; technical aspects; connection and networks, among others. When the teacher is in the virtual space, he or she must fit in what can be done in a face-to-face class. Now, to cover their topics, they must resort to extra tutorials, academic reloads, and other new approaches. For example, in experimental classes, where they have been the most affected, they must rely on simulation software, apps and learning objects to be able to adapt these practices.

On a descriptive hypothesis, the general objective of this partial research is to analyze the innovation factors from the pedagogical, communicative and technological dimensions, which can be attributed to virtuality from the students' perception, so that one can adapt to the challenges of the current university.

Virtuality arises as the first challenge from the observable. "Virtualization as the greatest innovation in educational processes [...] is part of the digital transformation that drives the technological revolution [...] and the university" (Rama, 2018).

Trying to take face-to-face classes to synchronous classes with remote assistance², a pragmatic resource used for an immediate solution, was proposed in many universities and that continues to be used after a year and a half since the beginning of the pandemic. The second option is the blended modality, which combines virtuality with face-to-face; only possible for small groups with biosafety since they must follow laboratory safety practices.

PROBLEM FORMULATION

From the students' perception, what characteristics should virtuality have in the post-pandemic university?

RESEARCH APPROACH

Following an empirical-analytical rational method that, according to Custodio (2008) "makes possible to reveal the essential relationships and fundamental characteristics of the object of study, accessible to the detection of perception", "its useful functionality stands out in the entry of unexplored fields or in those of descriptive study" (Raffino, 2020). The process to follow with the interpretive analysis method is: 1) to define the problem; 2) propose and test the hypotheses with fieldwork and finally 3) conduct analysis and interpretation.

2. METHODOLOGICAL DESIGN

The methodology, design, and development of research on a mixed approach are considered, which have "greater breadth, depth, diversity, interpretative richness and sense of understanding" (Hernández & Baptista, 2014).

Taking the position of the psychological discipline that defines perception as the "cognitive process

² Remote classes, online classes and virtual classes are taken in the article similarly in the period of pandemic.

of consciousness that consists of the recognition, interpretation and significance for the elaboration of judgments about the sensations obtained from the physical and social environment. (...), [and that] depends on the ordering, classification and elaboration of categorical systems” (Vargas, 1994, p.48). Marleau-Ponty in Vargas (1994) said that the observer does not perceive things in their totality. As a result, the most significant of each dimension is partially expressed.

In the case of the perception of virtuality, the experiential aspects that each individual has acquired in the interaction with virtual formats are involved from the communicative, pedagogical, and technological aspects.

The student perception of virtuality in a pandemic can be placed on valuation scales that are usually objective, but such perception can occur individually in students in a different way that also makes it subjective. “Thus, in order to capture both coexisting realities (inter-subjective reality), both objective and subjective vision are required. (...), They tend to balance between perspectives” (Hernández & Baptista, 2014) that justifies the union of the two paradigms, both quantitative and qualitative.

It should be noted that the quantitative study is considered more weighty to support the non-experimental cross-sectional method and the results are corroborated with the qualitative study, a design named by Hernández (pp. 572) as DIAC (design concurrent nesting), where “a predominant method guides the project (...) and the method that has the lowest priority is nested within the one considered central (...) The data collected by both methods are compared and/or mixed in the analysis phase”.

some advantages are that the researcher will have a more complete and holistic vision of the problem, and benefits from the perspectives that come from different sources.

Descriptive transactional studies as a scope of research collect data in a single moment. The quantitative part on simple random sampling and the qualitative part on directed sampling. The data collection technique for the quantitative study is by means of a questionnaire, with some closed questions and some on a Likert scale. For the qualitative studies, we work under the modality of a forum. The aim is to obtain the perceptions that students of the engineering faculty have about the virtuality that, in times of a pandemic, has had an impact on the dimensions already exposed.

POPULATION AND SAMPLE

The study was done with an online questionnaire as an instrument for collecting information and using inferential statistics with simple random sampling, which in turn “is the most used because the selection of participants is determined by random” (Salkind, 1998). Although the population should be all university students who in one way or another went from a presence to a virtuality in times of pandemic, only the students of the Faculty of Engineering of the Autónoma de Colombia University are used in the sample, with approximately 1200 students currently. If the sample is independent and “has the same probability function when chosen” (Torres, nd.) it can represent the population.

The study was conducted with students enrolled in the period 2020-I. The number of participants was 67 students. It is a population with students of diverse gender (56% males, 44% females), with ages between 15 and 40 years.

For the qualitative study, a “directed sampling” (Hernández & Baptista, 2014) is used for convenience, less strict but that “can offer greater richness in the data analysis” (Piza & Amaiquema, 2019). “In qualitative research, the sample size is not fixed a priori but rather a type of analysis unit is established (...), the final sample is known when the new units added no longer provide information or new data” (p.385).

3. RESULTS

The previous qualitative report of the sample, little more than the representative one (67), is displayed in the word-cloud of figure 1. Using a single word, the students made an approximation to virtuality, such as: internet, TIC, web, video conference, computer, technology, home, innovation, distraction, and education, among the most important.

COMMUNICATIVE RESULTS

The results in this dimension promote the forms, types, and ways in which students were able to communicate with the University, teachers, and their classmates during the pandemic.



Figure 1. A 'Word Cloud' related to what the students say about virtuality.
Source: Author

Table 1. Ways and frequencies of students' communication in pandemic with the Teachers, Classmates and University.

Commu/tion way	T	C	U	Σ
Phone call	10	41	25	76
E-mail	51	42	48	141
Virtual Classroom	43	21	22	86
WhatsApp	52	88	25	165
Face to Face	3	5	1	9
Web page	20	8	20	48
Video-Conference	44	28	12	84

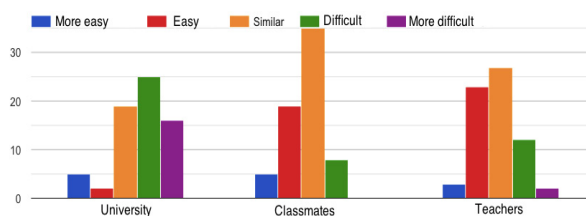


Figure 2. Perception of attitudes about communication.
Source: Author.

The preferred means of communication for students is WhatsApp, then email (see table 1). This is due to the fact that the majority of participants (60%) are between 15 and 25 years old. "Digital natives, born in the age of technology" (Paradigma, 2010) want communication to be as fast and continuous as possible. The perception of communication with classmates and teachers tends to be easier than communication with the university (see figure 2 and figure 3) The figures show that the students participate more in face-to-face or traditional mode. However, the levels of participation and distraction that the students have had in virtual classes tend to have a high level in both cases (see figures 4-5).

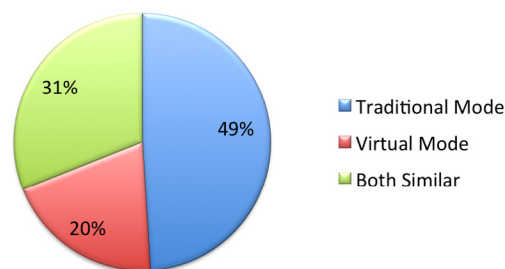


Figure 3. Participation according to educational modality.
Source: Author

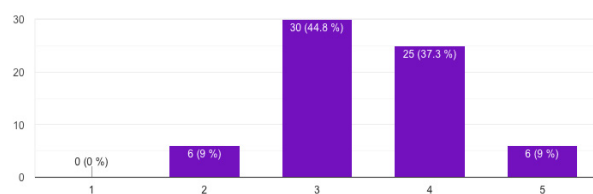


Figure 4. Perception levels of participation in remote classes.
Source: Author.

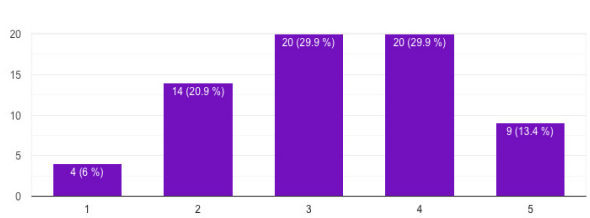


Figure 5. Perception levels of distraction in virtual classes.

Source: Author.

Using the Pearson correlation index of equation (1) (Vinuesa, 2016) a small direct relationship is found between the participation and distraction variables.

$$r = \frac{Cov(x,y)}{\delta_x \delta_y} = 0.2837 \quad (1)$$

TECHNOLOGICAL RESULTS

With the full range of services provided by TIC, “Both teachers and students can benefit from these technological inventions” (Palanivel, 2020). To this end, the devices used, connectivity, platforms, and the perception of their use were observed.

The desktop computer has been relegated to the laptop, but additionally, there is a considerable percentage of students - 22.4% (see figure 7) who use the smartphone to take classes remotely. The quantitative perception of network connectivity has a good value (see figure 6) however, some data show that lack of internet connectivity poses a threat to having good attention in virtual classes. On the other hand, the desktop computer is the device most used for written activities and the smartphone for leisure-related activities.

The video conferences and virtual classrooms have a good perception rating and the most used platform for virtual classes is Google Meet (see figure 8), perhaps because it is linked to the free Moodle platform that is used by the university.

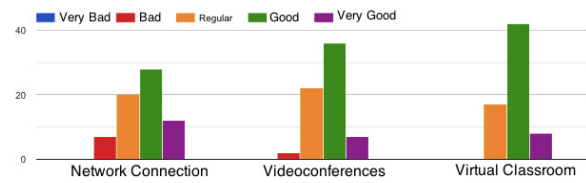


Figure 6. Perception of attitudes about network connection, videoconferences and virtual classrooms.

Source: Author.

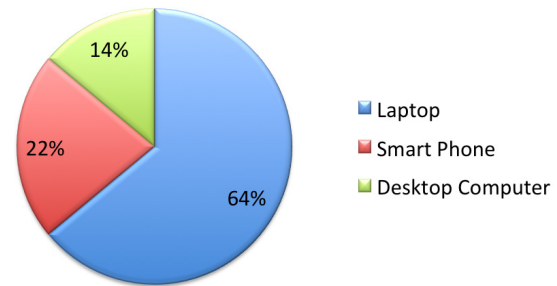


Figure 7. Devices used to take the virtual classes.

Source: Author

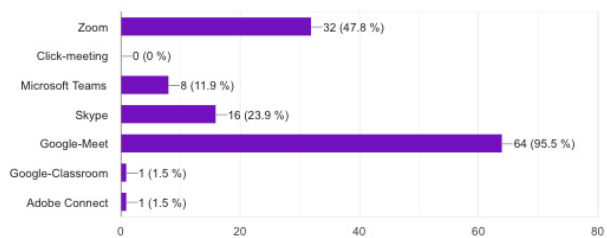


Figure 8. Platforms used to take the virtual classes.

Source: Author

PEDAGOGICAL RESULT

Educational models must consider both individual and collective knowledge construction processes in a horizontal way that also takes into account “the context, cognitive and learning styles and cultural differences” (Rozo, 2010). To this end, the virtual subject presents radical changes; “The student assumes absolute responsibility for their training” (Rojas, 2013, p.338), an autonomous learning where “teaching does not exist”. This forces us to change the roles and profiles described for face-to-face, bi-modal, and alternating environments. The pedagogical model may not change, but it will have to be readjusted.

The pedagogical results focus on how the student learns, his/her dedication, activities, evaluative forms, and didactic tools.

With the highest percentages (greater than 80%), the use of didactic material in times of pandemic defines the options that students generally had to involve in their teaching-learning processes, with digital books, videos and presentations (see figure 9). The low use of both simulation software (40%) and prototyping with hardware is indicated with only 4%, similarly it is perceived that physical books with 3% were relegated by not being able to access libraries in person.

Although approximately half of the students (46.3% in figure (10)) consider that their learning in virtual mode has been similar to the face-to-face case, the data shows that there is less learning in remote class mode.

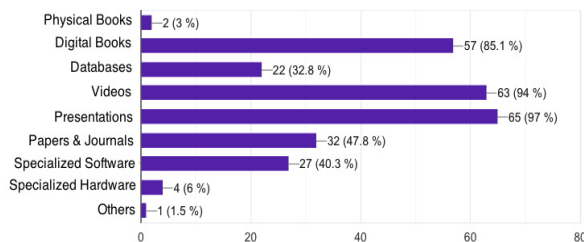


Figure 9. Didactic material used in times of pandemic.
Source: Author

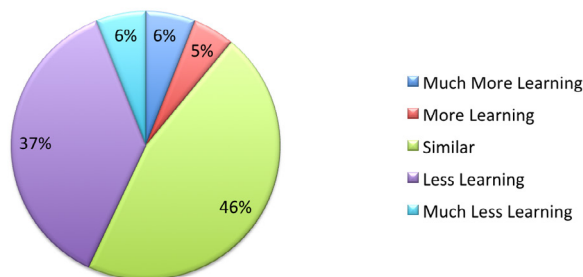


Figure 10. Perception of Learning in Virtual Mode.
Source: Author

Figure 11 indicates that the difficulty in virtual academic work has been between more difficult and much more difficult, at 47.8%, in the same way

the student perceives that he/she spends more time (43.3% in figure 12) than when added together they clearly show this trend with (56.7%).

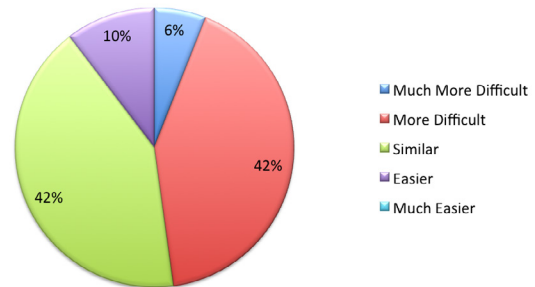


Figure 11. Perception of Difficulty in Virtual Mode.
Source: Author

The feeling of motivation appears more strongly in the face-to-face format, at 52.3%, than the virtual format, with 21.5%. This evidence shows the high percentage of student preference to have the teacher synchronously in the class, almost reaching 70%, against 6% of asynchronous class.

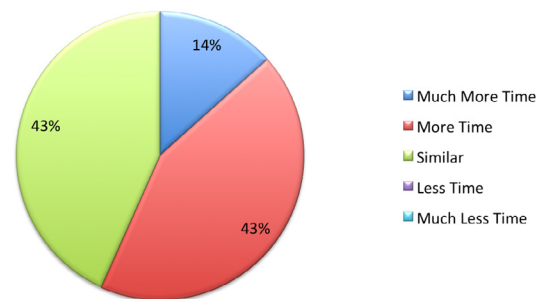


Figure 12. Perception of Time Spent in Virtual Mode.
Source: Author

Table 2. Matrix of Correlation Pedagogical Variables: Learning, Difficulty, Spent Time, Motivation, Distraction and Participation.

r	L	D	ST	M
L	1	0.1671	-0.1138	0.5636
D		1	0.1771	0.4324
ST			1	-0.093
M				1
Dis	-0.2603	-0.354	-0.213	-0.2817
P	0.6314	0.1868	0.0259	0.6387

We can see the matrix of correlation between pedagogical and communicative variables, including motivation in table 2, that show that the different variables: Learning-Motivation, Participation-Learning and Participation-Motivation have a moderate positive correlation (Sánchez-Escamilla, nd.); In addition to a linear trend between each pair of variables, it is noted that motivation is crucial in both learning and participation variables, and participation leads to more learning.

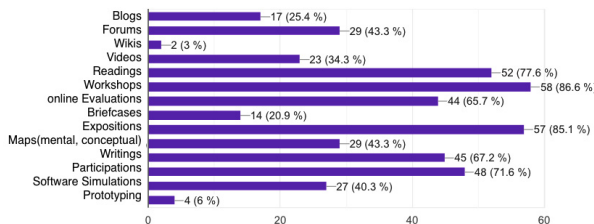


Figure 13. Evaluative Forms.

Source: Author

The most-used assessment forms in online classes are online evaluations, expositions, and readings (see figure 13). Participation is emphasized as a type of evaluation, with 71.6%. This result perhaps allows the participation variable to increase in remote classes, as observed in the results of Figure 4.

QUALITATIVE RESULTS

The results of the forum carried out on the Moodle platform showed 13 categories (see figure 14), of which 8 are the highest order. “The network of co-occurrences used to relate the categories and analyze content” (Dominguez, nd.) is shown in figure 15 using Cloud Atlas Ti (2017).

We can see in the network that there is greater cohesion between the face-to-face interactions with learning than with the virtual model; that is, the student perceives that in the face-to-face model, they will learn more.

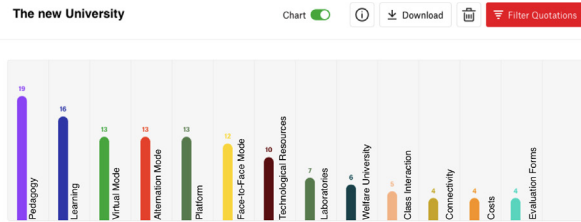


Figure 14. Categorization and Number of Citations in the Forum.

Source: Author

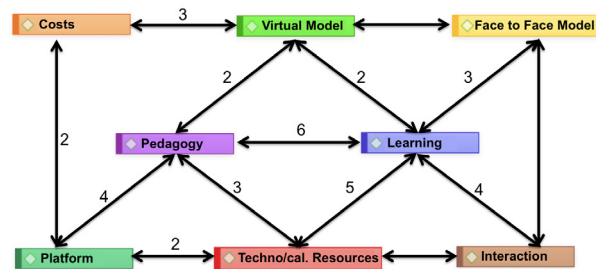


Figure 15. Co-occurrence Network with the more representative codes.

Source: Author

With strong cohesion, learning requires interaction in class and appropriate technological resources. It is a symptom that by incorporating new platforms in pedagogy, the learning cycle will also be greater. Finally, students perceive that costs are reduced in the virtual model, especially because the University uses free platforms, the student does not “spend” services within it, and they don’t need to go to the University.

Other results that are evident in short citations: the appreciation of the virtual classroom and video conferences as an indispensable tool for the different pedagogical activities: forums, workshops, quizzes, and documentation in general.

The little intervention of the university welfare and the scarce use of laboratory and physical prototyping in the online classes are emphasized. For this reason, the alternation model appears as a clear and necessary possibility not yet developed by the university.

4. DISCUSSIONS

While it is true that some universities have already started face-to-face classes, virtuality is here to stay. Education at any level will not be the exception. The use of ICT has greatly mitigated the impact that the pandemic has had on education, but as Forero (2021) asserts: “digital poverty has hindered academic training (...) experiencing an educational backwardness.” Hence, the new University, as has been observed in both quantitative and qualitative results, needs more and better technological resources for pedagogy and learning.

Rector of the Universidad de los Andes Raquel Bernal, in Forero (2021), suggests structural measures such as improving educational quality, leveraging technology in order to offer new learning routes, returning to face-to-face immediately, among others. The results show a need for face-to-face attendance, increases in difficulty with virtual learning, the decline in educational quality, the need for face-to-face communication with other classmates, and the teacher, that the ONU reaffirms (2021, p.28) as pedagogical and socio-emotional impacts left by the pandemic.

Post-pandemic education in the new University must learn how to reduce learning gaps from the various educational modalities such as: participation, educational and didactic resources, interaction, communicative and evaluative forms, among others.

5. CONCLUSIONS

With the arrival of the pandemic, all academic processes in face-to-face universities had to advocate for modifying the way the class was taught to students. In the new post-pandemic reality, virtual processes will probably continue to coexist and the new university must take into account how these processes

play out and learn from the student's perception to incorporate them in a more efficient way.

Virtuality is a very useful tool that, from its dimensions, provides ease, reduces costs, and allows the function of time, attendance and mobility to be considerably reduced. Students want synchronous and fast ways of communication, such as WhatsApp and video-calls. Although the spaces for participation are few, according to the results, they lose fear when speaking, so the levels of participation and distraction increase in the virtual format. Although small, the correlation values between these two variables are representative of the inherent relationship between them.

In very low use, the smartphone serves as a tool to take classes online and do academic work. Network connectivity listed as a threat when the students are taking classes has a good rating.

The perception of the quality of education in the virtual format is degraded because their learning is decreased, the time spent has been greater, and the student finds greater academic difficulty than in the face-to-face format. The low profile of university well-being and the lack of laboratories are striking, especially in engineering careers in times of pandemic.

It is certain that students in the new university must be more present in-person than virtually. Communication actions, technological resources, participation and interaction, motivate the student to adapt better skills. As an important piece in the society of knowledge, virtuality must also collaborate in it.

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