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Virtualization of educational environments for international collaboration: students as builders of their own learning

Virtualización de entornos educativos para la colaboración internacional: Los estudiantes como constructores de su propio aprendizaje

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Abstract

The incorporation of communication and information technology (ICT) has been a permanent theme in the most recent decades, generating an intense debate about its implications and efficiency, the possibilities to integrate more effectively educational proposals, among other aspects. However, to think in a compulsory use of technologies as the only way to pursue studies was unthinkable. Even though multimodal education models and diverse experiences in e-learning already existed, at the beginning of 2020, the COVID-19 pandemic triggered a crisis due to the impediment of carrying out face-to-face activities in the classrooms around the world. Considering all the emerging situations due the pandemic, the spirit of this article is to share, three years after, the vision of some Mexican students, participants, and ex-participants in virtual and on-line experiences from public universities, regarding mediatized education, and how they consider their learnings in this regard.

COVID-19, Learning experiences, Multimodal education, Students

Resumen

La incorporación de las tecnologías de la comunicación y la información (TIC) han sido un tema recurrente en las últimas décadas, generando un intenso debate sobre sus implicaciones y su eficiencia, las posibilidades de integrar de manera más efectiva las propuestas educativas, entre otros aspectos. Sin embargo, pensar en un uso obligatorio de las tecnologías como la única forma de continuar estudios era impensable. A pesar de que ya existían modelos de educación multimodal y diversas experiencias en e-learning, a principios de 2020, la pandemia de COVID-19 desencadenó una crisis por el impedimento de realizar actividades presenciales en aulas de centros educativos de todo el mundo. Considerando todas las situaciones emergentes por la pandemia, el espíritu de este artículo es compartir, tres años después, la visión de algunos estudiantes mexicanos participantes y ex participantes en experiencias virtuales y on-line de universidades públicas, respecto a la educación mediatizada, y cómo consideran sus aprendizajes al respecto.

COVID-19, Experiencias de aprendizaje, Educación multimodal, Estudiantes

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Introduction

Facing the educational crisis motivated by the planetary health emergency of COVID-19, an interdisciplinary group of Latin-American researchers from Mexico, Colombia, and Costa Rica carried out, during the past two years, initiatives to participate actively in the comprehension of the unexpected situation. This year, the responsibility for the third part has been assumed by a research group from the Autonomous University of the State of Morelos, with the participation of undergraduate and graduate students. The stages prior to this study, in a very general way were:

a. At the beginning of 2020, a preliminary diagnosis research was conducted, done with the participation of teachers from eight Latin American countries. Considering the results, a comprehensive program of pedagogical strengthening was designed, through on-line and virtual environments, based on a pinwheel model that continues in action to date, and platforms such as Moodle, Microsoft Teams, divers free access applications, etc. (Juárez-Salomo, 2020).

b. In 2021, a second stage started, students from selected seminars, took an active part in their own learning, designing initiatives to acquire and strengthen their global consciousness through virtual environments, sharing the experience with students from Central and South America under the model of Collaborative on-line International Learning -COIL- (Juárez-Salomo et.al., 2021; SUNY-COIL, 2017).

As a part of this previous stages, a new initiative was conceived, related to how the students visualize the pedagogical challenges faced and their opinions for the near future. It is important to mention that both research antecedents gave the impetus for the development of some courses, oriented towards university students who, incorporating the concepts of emerging pedagogies and social innovation, had found strategies to enrich and make their own learning process, more meaningful, making proposals, both theoretical and practical.

With the collaboration of their international colleagues (Juárez-Salomo, N. & Cárdenas, G. 2020). For this 2022, fronting the gradual restart of face-to-face learning model, it is important to recover the lived experiences, concentrating energies on the main actors: the students. Although the previous stages were aimed at strengthening the skills (pedagogical and didactical strategies) of teachers and graduate and undergraduate learners, the primary reason has always been able to provide relevant and timely support, so that students can strengthen their learning, despite the existing challenging conditions, therefore, a third phase was developed.

The project presented below is based on two fundamental questions: What do the students think about the changes made during the pandemic? and how they handle, after these two years of experience, the responsibility for their own learning? The general idea is to know if the participants consider that their learning through virtual and/or on-line resources, had been a useful and enriching way to learn, and if they believe it´s important to conserve at list a blended model or, contrary, the mediated education what they experienced, was more forced by the situation and they keep the desire to return to "normality".

Review of Literature

Answering to the unexpected arrival of COVID-19, the various population sectors, including the educational, had to adopt extraordinary measures. Due to the impossibility of continuing teaching in person, the professors faced the need to take virtual or e-learning training in an accelerated way to incorporate techno-educational tools to keep in touch with their students during the pandemic. From their homes, they had to devise quick solutions to teach their classes, even without having prior knowledge of e-learning and virtual education. Related to this pressing situation *Francesc Pedró*, director of the UNESCO International Institute for Higher Education in Latin America and the Caribbean stated that the pedagogical world continuity required, more than ever, technological solutions within the reach of institutions, teachers, and students (IESALC, 2021).

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Since the beginning of the pandemic, an enormous number of instructional activities and materials with technological tools have been devised, under conditions in which the creation times vary from a few days to a few weeks, adapting to an educational modality never experienced before, making this process a highly frustrating and overwhelming one. This stressful situation was coined as "*coronateaching*" (UNESCO, 2020), ironically to describe the need to respond from teaching to update itself overnight in front of the global state of emergency, but also to point towards all the possibilities of development to come.

In various forums and webinars held throughout the confinement and still in the present, the speakers repeatedly fall into misconceptions about concepts and scope of the various educational models, pedagogical approaches and even the difference between platforms, tools, or sites, to mention some aspects, and very often, teachers adapted the strategies and models they knew to digital environments, without a fully understanding of their scope and possibilities. For this reason, it is important to clarify in this article some basic concepts.

To start, based on the definitions provided by the Observatory of the Institute for the Future of Education and the Technological Institute of Monterrey, Table 1 summarize different emerging learning methods that have been applied to classes, such as online, virtual, distance, and remote emergency education, to name a few (Ibáñez, 2020):

Model	Definition	Teacher Rol	Tools Examples	Advantages
On-line Education	Teachers and students participate and interact in a digital environment, through technological resources using the facilities provided by the Internet and computer networks in a synchronous manner.	Tutors: Accompany and assist the student in their learning process.	Schoology, Edmodo, Blackboard, Zoom, Google Hangouts y Google Scholar, etc.	Openness Flexibility Efficiency Personalized accompaniment Economy Community
Virtual Education	This model requires mandatory technological resources (computer, smart phone, or tablet), internet connection and the use of a multimedia platform. It works asynchronously.	Share reference and work materials through platforms, where students can upload their activities for review. Provide feedback for students to see their areas of opportunity.	Plataformas como Moodle, Canvas, Blackboard, Edmodo, Schoology o por correo electrónico.	Flexibility Efficiency
Distance Education	Unlike virtual education, distance education may have a face-to-face percentage and a virtual one, however, this may vary depending on the institution where it is taught. Students have control over the time, space, and pace of their learning, because an Internet connection or computer resources are not required. The materials used are normally physical, such as notebooks, pens, colors, or USB sticks, CDs, among others. Many programs even send educational materials and lessons by mail, radio or TV Channels.	Once the learning resources such as activities, USB, or CD are delivered, teachers are responsible for qualifying and accrediting them and giving feedback by phone, email, or text message. In some cases, teachers have the role of recording the session or class that is going to be broadcast on television or radio.	Television, radio, email, postal mail, physical resources such as notebooks, books, notebooks, pencils, etc.	Flexibility Accessibility
Emergency Remote Education	Concept born because of COVID-19 that consisted of adapting educational methods in a very short period to continue teaching classes to all students. Move face-to-face courses to a remote, virtual, distance or online classroom. The term emergency remote education is completely new, as the roles and tools are not defined.	It may vary depending on the method used.	Varían dependiendo del método.	This method prioritizes the emergency and looks out for the well-being of its students. This new term groups together all the actions coming from governments, companies, non-governmental organizations, and people to find solutions and stay constantly updated, so it can change suddenly if the emergency changes.

Table 1 Emerging Learning Methods
Own Elaboration based on Ibáñez, 2020)

To understand properly the advantages mentioned in the last column of Table 1, Ibáñez (2020) defines each of these advantages:

ISSN: 2523-2444

- **Openness:** Access to information is expanded while this method reduces geographical barriers, since anyone, regardless of their location, can join the courses.

- **Flexibility:** It favors self-management of dedication times. Activities can be managed asynchronously; students have more personal space to have flexible schedules and manage their personal and professional time as they prefer.

- **Efficiency:** This method promotes the development of personal autonomy, so that the student can manage himself. It is handled in a session-feedback way, so this helps topics move quickly, distractions are avoided, and students go at the same pace.

- **Personalized accompaniment:** Online education is distinguished by offering personalized accompaniment to the student,

- **Economy:** Expenses for the use of physical spaces are reduced, in addition to transfers.

- **Community:** Debate and dialogue are promoted more, in addition to a community linked to academic knowledge.

- **Accessibility:** Distance education programs have more range and reach people of all socioeconomic levels thanks to the simplicity of the technological resources required for classes.

Just as the favorable aspects of pedagogical methods based on or supported by technological resources are mentioned, various sources of information refer to the disadvantages or challenges that student face (EUDE. 2021) such as:

- Requires self-discipline and perseverance. Flexibility in studies can apparently be an advantage, but it also requires significant willpower since one will be the main person responsible for fulfilling and keeping everything up to date.
- Social isolation. Studying online is a very lonely activity since student will not socialize with their classmates or teachers beyond communicating for study-related topics. It is currently the most appropriate due to the pandemic, but in the long run you may miss contact with people.
- Less practical training. Being an online training, the practical part of the subjects will be significantly reduced since one will not have a physical space to carry out the practices.
- Requires good technology. To be able to do the online classes properly, it is necessarily to have a good computer that works correctly and a good internet connection.
- Low quality offer. The fact that there is a wide range of training does not imply that everything is of quality. Everyone must be careful to detect which ones are good or not.

Additional to the mentioned aspects, the experience showed various situations such as little personalization or assessment or follow-up, less participation of students in class, absences, "fictitious" attendance or abandonment of courses, inadequate evaluation strategies, large number of hours in front of the screen, few spaces for students to interact with each other, various distractions, inadequate study spaces, greater possibility of cheating in evaluations or deliveries of work, among other aspects.

It is important to mention that it is not the intention to make an exhaustive analysis of the educational models related to the ways in which the students responded during the pandemic, but it is important to include an even more elaborate concept that is not yet registered in the Observatory of the Institute for the Future of Education and the Technological Institute of Monterrey, that was taken as a basis for Table 1, possibly due to its complexity, and refers to the “educational multimodality” that points out to the various ways of developing and accessing information and knowledge, making use of technological cartographies.

ISSN: 2523-2444

In virtual environments, knowledge is built through the dialogue of multiple intersubjectivities, creating a polyphony of voices that share knowledge, experiences, ideologies and different positions regarding life and social spaces such as education.[1]

Due the pandemic, the world is experimenting diverse educational changes, and any type of useful learning methodology is welcome, seeking for alternatives to reconduct initiatives to clarify the future of current generations. In the past, distance education was a revolutionary way to reach people out of the traditional educational centers, and in the present, through digital environments, has become very relevant, and new technologies have become the main resource in the process as they help teachers and learners stay connected without having physical interactions.

This historic phenomenon will remain as an example of what the educational actors had to do to continue, as well as the learning of what should be foreseen in the face of phenomena of planetary magnitudes to be doubly aware of the decisions that must be taken. As an advanced example, the internationalization strategies that became very popular during the pandemic among universities from various parts of the world were the initiatives based on the International Online Collaboration Model (COIL), focused on the exchange between academic peers and students, to seek the development of involving the participants in "*glocal"*[2] action dynamics (SUNY COIL, 2017; Juárez, N; Cuevas, M, and Gama, G. 2017).

An additional concept to emerging pedagogies is the "emerging technologies" that George Veletsianos (2010) proposed a little over a decade ago specifically for education saying that "...emerging technologies are tools, concepts, innovations, and advances used in various educational contexts at the service of various purposes related to education.

Furthermore, I propose that emerging technologies ("new" and "old") are evolving organisms that experience cycles of hype and, while potentially disruptive, have not yet been fully understood or sufficiently investigated. (Veletsians 2010, pp. 3-4)

Finally, as theoretical support for the educational transformation caused by COVID-19, it is essential to mention the need to seek significant, useful, transformative learning by various means. Coinciding with Ausubel (2002), meaningful learning is characterized by building knowledge in a harmonious and coherent way, so it is learning that is built from solid concepts. Ausubel mention that is like a series of communicating vessels that interconnect with each other forming networks of knowledge. Understanding is a good start, but what must be verified is the interconnection achieved by the student, and with respect to their classmates and teacher.

Methodology

Background:

The learning process, in a positive and innovative sense, requires providing the students opportunities to learn, know and experience, whether in face-to-face, virtual or hybrid environments, to stimulate the intellects of young minds, eager to exist significantly on the planet. It is vital that school learning experiences go beyond traditional forms, styles, and schedules, allowing students more authentic experiences and application of knowledge in real life (OECD, 2020).

Clearly, the COVID 19 pandemic represented a huge and unexpected challenge for education, taking to the limit the tolerance of parents, students, and teachers. During the pandemic, people had to adapt in fast track to a new routine and the partial or total incorporation of learning models in line. For this reason, it is crucial to recover the facts and generated information to know the opinions of those involved; to think the implications working at home; to reflect about the number of hours in front of a computer; the understand the need to unlearn to adopt alternative paths of study; the possibilities of reinvention.

[1] The concept of multimodality has been addressed by various authors, among which were taken for this article. Santamaría (2015); Fainholc, B. (2004); Cabero (2006); Martos (2009); Plaz y Vessuri (2000) & (Borràs (2005).

2 The adjective "glocal" is a well-formed acronym from global and local, which is frequently used in the economic field, but also in others such as culture (Fundéu RAE, 2019).

ISSN: 2523-2444

It is necessary to understand the similarities and/or the differences between remote or virtual education and "traditional" methods, finding ways to build bridges instead of gaps.

Clearly, there are enormous differences between the educational systems and resources of each nation, and there is a huge distance between what is desirable and what is possible. Despite having advanced in the needs and characteristics of learning, technologies and economical resources still represent enormous defies and inequalities in opportunities, institutionally and for individuals (teachers, parents as well as students). For this reason, it is necessary to insist on the generation of formal research to document and underpin specific proposals for action to be ready and anticipate possible challenges like the current ones.

Considering the multiple challenges, it is not easy to identify the variables and ways of approaching the information. However, taking as inspiration a consultation carried out by Google and UNICEF on September 11, in which more than 850 young people between the ages of 14 and 19 participated, the aim was to find out how adolescents adapted to distance education in times of COVID-19? What learning modalities were incorporated during the pandemic, and if they would like to maintain it when face-to-face classes return? (Google[3]-UNICEF[4], 2020).

As has already been mentioned, this is the third part of a research carried out from a public university in Mexico and its Latin-American partners. At the beginning, the idea was to work with students exclusively from local university, to generate an instrument for making decisions in an internal informed manner, but its design and methodology sparked interest of students and professors from the previous working groups, and it was decided to share again the questionnaire with participants from Colombia, Costa Rica, Chile, Peru, Argentina, with which collaboration ties are maintained, as well as Mexico.

[3]Google: Google is an internet search engine. It uses a proprietary algorithm that's designed to retrieve and order search results to provide the most relevant and dependable sources of data possible.
[4]UNICEF: United Nations International Children's Emergency Fund. In 1950, the UNICEF mandate was broadened to address the long-term needs of children and women in developing countries everywhere.

ISSN: 2523-2444

Methodological design

The design work of the instrument began in February 2022, based on the information generated in previous stages of the research and some ideas from the survey carried out by Google and UNICEF in 2020, but since they were students of a higher age range, the selected variables were grouped into the four priority aspects to be addressed, as illustrated in figure 2:

Figure 1 Variable Groups Included
Own Elaboration, 2022

Prior to the design of the instrument, a focus group was held in which academics and researchers from the university participated to discuss general aspects such as discussing, when talking about the paradigm shift in education, how is it going to be understood? Likewise, concepts such as distance education, virtual education, tele-education, mediated education, multimodal education, among others, were pointed out, to harmonize concepts and be able to build a common conceptual base. Another important reflection was to reflect on how multimodal education impacts the Institutional Educational Model. As well as what considerations should be made for teaching practice? Exchanging ideas related to planning, didactics, learning (significant and useful) strategies to measure learning (evaluation), especially facing the reality of state public universities.

In the case of a topic with very diverse variables, the idea is not to carry out exhaustive research, but to take the pulse of the students in relation to their learning considering recent events. To start, within each item, some elements were defined:

Cognitive aspects

This item considers prior knowledge about the management of technologies for educational purposes, as well as notions to access, prepare, present works, do research or make presentations including multimedia materials, know how to work in various virtual environments such as platforms, applications, reservoirs, among others.

Behavioral aspect

This section explores, for example, attitudes, disposition, study habits, discipline, work organization, especially those behaviors related to initiatives that have contributed to carrying out learning activities, considering the collaboration and active participation in the sessions. synchronous, such as complementary activities.

Emotional Aspects

This section is one of the most sensitive because it seeks to know how the students have felt in a range that goes from indifference or apathy to moments of crisis, of hope, uncertainty, anger, among others.

Appreciative aspects

Finally, a space is opened for students to express opinions about the situations experienced with their teachers, classmates, at home and they are invited to share which is the direction that, according to their opinion, education will take when "normalizing" school activities.

Starting from the idea that ICT only acquire meaning when they are ordered to goals that are not themselves, such as the comprehensive development of people using technology in activities such as research (Viejo, Cabezas, & Martínez, 2013) in this paper colaborators seek to find spaces to understand the meaning and relevance of the use of technological resources considering the point of view of the students.

Opportunities and Challenges Analysis

The development of Communication and Information Technologies has been acquiring greater presence, generating great transformations in society linked to labor, educational, intellectual, sports, communicative and recreational relations, among many others. ICTs have caused various cultural alterations, creating a new society, to which the prefix cyber is placed, framed within the consumerism of information and the computer revolution (electronics, telecommunications, information highways...).

The growing interconnection between users fosters possibilities in multiple areas of life, and education is no exception. For at least three decades, universities have been in the task of aligning their policies, models, plans and specific actions, to comply with an environment that cries out for planetary efforts to solve common problems. It is enough to think of the Sustainable Development Goals proposed by UNESCO to know that the common planetary destiny requires coordinated attention among nations (ONU-UNESCO, 2015).

The common agenda has intensified since the COVID19 contingency, causing a practically mandatory migration of academic activities to virtual environments and models, requiring the accelerated development of comprehensive teaching, and learning strategies that involve the use of information technologies. and communication (ICT) but in a coherent, purposeful, and innovative way, based on new models, and the need to train professionals capable of facing global problems, reinforce the argument for action.

Clearly the COVID 19 pandemic represents and will continue to do so in various aspects of life, for parents, students and teachers, a great challenge, having to adapt to a new routine and the partial or total incorporation of learning models in line. For this reason, it has been important to give structure to homework, and although following a routine is beneficial, it was not desirable from the beginning for students to spend many hours in front of a computer. For this reason, this research is proposed to allow what has been experienced to be part of a process of unlearning, or rather, of reinvention to understand that a traditional program as it was known is not the same as a virtual one such as the one required.

Implications of the Research

Even though the initial goal was to have at least one hundred students, the instrument was applied to 143 participants from Mexico, Peru, Colombia, Argentina, and Costa Rica, most of them at the bachelor's level (83.9%), master's level (11.2%). and (4.9%) doctorate. As previously mentioned, the questions were divided into four aspects that served as a guide to determine the items and variables: cognitive, behavioral, emotional, and appreciative.

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In this segment, the most relevant results are shared that lead to understanding the characteristics and challenges faced by students when continuing with their training process, both in undergraduate and graduate studies. As a first part, the previous knowledge of the students about the use of technologies is explored. 67.1% state that they have previously worked with technology, but only 38.5% had taken an online or virtual course on a platform.

The most used digital resources for non-formal learning are the creation of documents, spreadsheets, and presentations with 84.6%, the use of information search engines with 81.1% and applications, sites and image, audio and/or video tools. by 67.8%. Likewise, messaging services with 65% and mobile services with 46.9%.

During the pandemic, the main resources and platforms used were Meet (69.9%); Microsoft Teams (55.9%) and Moodle (28.7%), highlighting WhatsApp (82.5%) and email (75.5%) as basic and/or support services. 74.8% assured that they had prior knowledge of these resources even before the pandemic. The most used resources for the design and/or delivery of works were PDF (90.9%), Word (89.5%), Power Point (85.3%) and photographs of handmade documents (69.2%).

When asked if the platforms, applications, and digital programs used by teachers were motivating and/or captured their interest, 74.8% gave a positive answer and 90.2% said they use digital resources frequently. 38.5% declared that adapting to classes in remote mode was complicated, but they managed to adapt and 26.6% considered it simple and their adaptation process was almost immediate. Only 15.4% say they have not adapted and hope that classes will be restored as they were before the pandemic.

Regarding the technological resources preferably used to connect to virtual classes, the cell phone stood out with 43.4%, followed by a laptop with 44.1% and the rest with a Tablet or desktop computer. Almost half of the students connected from their room (49.7%) and 34.3% from a common area of the house (living room, dining room, kitchen, etc.).

The participants mentioned that the Internet connection used was stable, but occasionally had failures (70.6%) and only 18.9% declared that they had a very stable connection and with a signal for the entire class, facing poor Internet connection among the main challenges (65.7 %), house noises (65%), boredom (48.3%) and housework (39.2%).

To investigate a little about the emotions experienced during the pandemic, the students who felt negatively affected shared having felt above all anxiety (49.4%), apathy or discouragement (12.6%) and headaches and body aches 5.6%, however, a 15.4% stated that they had not had any problems and even 11.2% declared that they felt comfortable at home.

Regarding the lack of contact with their peers, 46.9% mentioned feeling affected only occasionally and not feeling affected at all (25.9%) or rarely (48.3%). The face-to-face activities most missed were coexistence in general (65%), practical activities and outings (53.8%), classes in general (42.7%), classmates (25.9%) and teachers (15.4%), accepting that the activities proposed by them were helpful to achieve learning in 85.3%.

Regarding the main appreciations of the students about the learning events experienced during the pandemic, the general assessment was positive towards the flexibility of schedules (52.4%), the variety in the sources of information and resources (26.6%) and the availability of resources. (12.6%), as well as the diversity in the forms of evaluation (8.4%).

93% considered that most teachers made efforts to adapt to the alternative way of working and think that soon there should be more work with the support of technology (74.1%), while 24.5% value that it will be the same as now.

Finally, regarding the question of whether they feel prepared to learn independently and manage information and communication technologies by deciding their own learning path, 58.8% answered no or, leaving 41.3% who answered affirmatively.

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Conclusion and Recommendations

Reflecting on participants responses, there is a gap between what is desirable and what is possible and, despite having advanced in the needs and characteristics of learning through technology, there are enormous inequalities in opportunities and resources, both institutionally and in the economy, both for teachers and for students and therefore, we must insist on the generation of studies that document and support specific proposals for action.

The set of resources, processes and tools of Information and Communication applied to the structure and activities of the educational system in its various fields and levels must be carefully reviewed and analyzed to respond cautiously to the new challenges and needs in the educational field, not only instrumentally, but also considering the implications in the development of a digital culture in classrooms.

When planetary challenges such as the COVID-19 pandemic find a solution in the use of information technology, that is, in the use of computers and more telecommunication equipment for data storage, transmission and manipulation, users must reflect on the use of technological devices for educational purposes. Based on recent experience, students can access much more information through the implementation of new technologies that, by the way, also open up new recreational spaces and the creation of training spaces.

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