Digital tools for the evaluation of learning in virtual environments during the coronavirus (COVID-19) pandemic

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Abstract:
Background: *The aim of the research was to describe the methods and strategies implemented with digital tools in the teaching-learning process, with an emphasis on evaluation and feedback, in the distance education scenarios that emerged during the confinement caused by COVID-19.*
Materials and Methods: *A mixed and descriptive study is presented whose non-probabilistic sample of participants corresponds to 198 teachers from various Mexican states and educational levels.*
Results: *The results indicate that teachers have diversified digital tools to carry out evaluations appropriate to the current context, favoring interaction and timely feedback from students.*
Conclusion: *The new educational scenarios are required, with innovative proposals that help the student to have a meaningful learning.*
Key Word: *Virtual learning environments; Learning evaluation; evaluation instruments; feedback.*

I. Introduction

The COVID-19 pandemic has made online education more relevant as it is the immediate alternative for institutions that operated in a face-to-face or mixed mode. Learning environments moved to institutional platforms or emerging spaces of continuity. However, the evaluation of learning has become a focus of your attention, since it constitutes a factor that largely determines the way in which the student prepares, considering that one of his main concerns is to pass the subjects and achieve good grades [1], at least in Latin American countries like ours: Mexico. The foregoing invites us to modify traditional evaluation strategies and seek new ways to develop and evaluate learning, in such a way that they lead to better performance of future professionals, trying to make students more involved and responsible for their own learning.

In addition to the above, the evaluation of learning in virtual environments has become even more complex to carry out, in an uncertain context in terms of the identity of the person evaluated, the physical context in which they are located, the privacy of the actors involved. and the available infrastructure, among other factors, which makes it difficult to implement different evaluation methods, both formative and summative, necessary to make the evaluation a rich and creative process that transcends the exams traditionally applied in the face-to-face modality [2].

On the other hand, in Mexico, distance education faces various challenges related to technology and the context in which teachers, students and Mexican society, in general, operate. On the one hand, it is necessary to guarantee that telecommunications and telepresence reach all corners of the country, so that all students can have access to information and synchronous sessions have a place. On the other hand, it is necessary to technically train trainers and users in the proper use of the available technological tools.

The foregoing has become even more evident in the face of the pandemic caused by COVID-19, where the digital divide related to access, use and skills in the management of technology has forced teachers to implement strategies such as the distribution of printed booklets using means of transport to be able to reach the most marginalized communities. Thus, the most favored educational scenarios during confinement have been those located in places where telecommunications allow the sending of text messages, video calls and video conferences, in the best of cases. However, the abrupt and unexpected change from the face-to-face modality to the distance modality has led teachers to urgently seek different ways of interacting with their students, with little or no eye contact, with the consequences that this entails, and the difficulties increase. when it comes to evaluating the learning achieved. In this sense, although at the beginning the design of the evaluations and/or

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work material represents an effort for the teacher; subsequently, the workload will be reduced by obtaining immediate results in terms of qualifications and the delivery of electronic work that physically disappears [3].

In this regard, Ardura and Zamora [4] state that Virtual Learning Environments (VLE) make it easier for students to self-assess their work and that of their peers through tests designed by the teacher, which allow them to know their mistakes and, consequently, address its correction. EVAs help students become aware of what they learn, to the extent that it favors self-reflection, increases motivation, commitment and responsibility for their own learning, thus allowing them to become the protagonists of their learning [5].

In consequence, this paper analyzes the evaluative role of the teacher during the first phase of the COVID-10 pandemic, specifically in relation to the tools used to assess student learning.

II. Material And Methods

The Second Symposium on Technology and Education was organized in July 2020 by the Mexican network of Academic Bodies made up of "Computer Science Unit Tizimín" and "Software Engineering for Education", both from the Autonomous University of Yucatan, as well as "Educational Mathematics in Teaching Professionalization", from the Autonomous University of Zacatecas, mÉXICO. In its second edition, the event was held virtually, for which various platforms and tools were used, so that the participants could access it easily and simply. A total of 802 participants registered for the symposium, of which 198 collaborated voluntarily by answering the closed instrument that allowed the collection of quantitative data analyzed here. These data are complemented by the qualitative information obtained from the exchange of experiences carried out between the exhibitors and those attending the panel tables.

Study Design: Descriptive and mixed study.
Study Location: Several mexican states and educational levels.
Study Duration: March to July, 2020.
Sample size: 198 teachers.
Sample size calculation: Intentional sampling based on availability of teachers.
Subjects & selection method: the 198 participants collaborated voluntarily by answering the closed instrument that allowed collecting the quantitative data analyzed here. These data are complemented by the qualitative information obtained from the exchange of experiences carried out between the exhibitors and those attending the events. The non-probabilistic sample of participants corresponds to teachers from Mexican states and several educational levels.

Participant's profile:
1. Of the teachers who participated, 56% are women and 44% are men.
2. The ages of the bulk of the participants are between 26 and 45 years old. 7% are under 25 years old, 12% from 26 to 30, 23% from 31 to 35, 21% from 36 to 40, 16% from 41 to 45, 13% from 46 to 50 and 7% from 51 to 60 and 1% are over 60 years old.
3. Most of the teachers work in the public education sector. 68% of the participants work in the public educational sector, 24% in the private sector and 8% in both, with more than one job.

Regarding the educational level in which the participants work as teachers, there is a similar distribution between the secondary level (24%), upper secondary (24%) and higher (29%), although preschool teachers also participated (3%), primary (17%) and other levels such as postgraduate, higher technology, training company and special education (3%).

Procedure methodology
The duration of the event was three days, during which ten presentations and six workshops were held whose themes were related to education and technology. In addition, four panel tables were organized in which teachers grouped by educational level participated: primary, secondary, high school and higher level. The topics addressed in the panel tables revolved around the strategies implemented by teachers with their students, during the confinement period that forced them to modify the traditional way of teaching, learning and evaluation.

The applied instrument was made up of two groups of items: in the first group, information was obtained regarding the general opinion of the symposium and the second group of items was oriented to the teaching and evaluative practices implemented during the pandemic period. From the second group of reagents, the information presented below follows. In the instrument, it was requested to select which of the listed tools the teacher used to work with his students, with the possibility of specifying any other that was not in the displayed list. It was also requested to indicate how it evaluated its students during the contingency period, for which a list of options was provided from which more than one could be selected, in addition to specifying textually any other that was not listed. In the following reagent, it was requested to indicate at what level the teacher considers

that the learning objectives or competencies of their own students were achieved, in the period from March to July 2020 and, finally, what possibility they consider exists to continue using technologies in their daily classes, after the contingency. In the last two items, the response options correspond to a Rickert scale with five possibilities.

In addition to the above, the answers provided by the panelists of the four organized tables, as well as the questions and comments made by those attending them, allowed obtaining complementary information, which allowed a better understanding of some data collected from the closed instrument that some of participants (25%) responded at the end of the event.

III. Result

Data were digitalized using Google Forms and analyzed then. Regarding the tools used to work with students during the first months of the contingency in Mexico (March to July 2020), Table no 1 shows the tools and percentages of people who mentioned them, respectively, ordered from most to least frequently. In the option to specify some other tool, the following were mentioned: Aiko, Book Creator, Canva, Easel.ly, Edmodo, Edpuzzle, Educaplay, Emaze, Genially, Glogster, Hangouts, Instagram, Kahoot, OBS studio, Openboard, Piktochart, Telmex Platform, Powtoon, Quizziz, Schoology, Telmex Videoconference, Visual.ly, Webex and Wordwall.

Table no 1: Technological tools used during the pandemic by teachers.

Tool	Teachers	Percentage
WhatsApp	115	58%
Google Classroom	90	45%
YouTube	64	32%
Zoom	58	29%
e-mail	56	28%
Google Forms	50	25%
Google Meets	48	24%
Facebook	45	23%
Microsoft Teams	42	21%
Web Pages	34	17%
LMS	31	16%
Skype	13	7%
Blog	8	4%
Socrative	4	2%
Others	28	14%

Forms of evaluation during the Pandemic (COVID-19)

In the question focused on obtaining the strategies and tools used by teachers to assess their students' learning, a list was provided with some options, from which teachers could select more than one answer, in addition to the possibility of indicating another way. to evaluate in case, it does not appear on the list. The results obtained are shown in Table no 2, ordered from higher to lower frequency of mentions.

Table no 2: Shows percent of teachers who implements several strategies to assess learning. The tasks and the sending of evidence by various means correspond to the means most used by the participants. In second place is the student's participation, which includes the use of virtual forums, videoconference sessions, among others. Performance observation corresponds to responses focused on the use of videoconferencing, videos made by students, and written tests, among others. In the use of questionnaires, the handling of the textbook and the application of forms were contemplated.

When specifying what the other ways of evaluating were, the participants listed the following list: Use of Gamification Projects, Communication with parents, Evaluation on the platform using the thatquiz application, or the same ones that can be made in schoology, Prior to the contingency event, we had the opportunity to strengthen the theoretical and experimental stages. They only had to focus on developing their research reports, strengthening their thesis, and preparing an article for review, Disposition, attitude, chats, rubrics and evidence of products, briefcase, Exams, and pedagogical booklets.

Table no 2: Strategies to assess learning.

Assessment	Teachers	Percentage
Tasks and submission of evidence	156	78%
Participation	80	40%
Performance monitoring	65	33%
Questionnaire	62	31%

Others	11	5%
None	2	1%

When asked about what the possibility of the teacher is continuing to use technologies in their daily classes after the contingency, the answers obtained were those shown in Table no 3.

Table no 3: Shows percent of teachers planning to continue using technologies after the contingency, 76% think that the possibility is very high, 20% high, 4% medium and there were no mentions of the last two levels: low and very low.

Table no 3: Use of technology in class after the pandemic.

Possibility	Teachers	Percentage
Very high	150	76%
High	40	20%
Medium	8	4%
Low	0	0%
Very low	0	0%

Finally, when faced with the question focused on the level of achievement that each teacher considers having reached during this period with their students, in terms of learning objectives and competencies, the answers are shown in Table no 4.

Table no 4: Achievement of learning objectives and competencies.

Possibility	Teachers	Percentage
Very high	26	13%
High	66	33%
Medium	100	51%
Low	5	3%
Very low	1	1%

IV. Discussion

Analyzing the results presented in the previous section, it is observed that there is a comparable balance in terms of the gender of the participants. Likewise, the ages range from 26 to over 60 years, although only 8% of the surveyed population is over 50 years of age. This indicates that the teachers surveyed are mostly young adults, who work predominantly in public education institutions. It is also observed that about a third of the participants work at the Higher level, followed by the High School and Secondary levels, then the Primary level and, less frequently, the Preschool level. Thus, it can be affirmed that, during the pandemic, teachers at all different educational levels took on the task of looking for alternatives that would allow them to continue their teaching work in the face of the new circumstances that they unexpectedly faced.

In this sense, the most popular tool used by teachers for remote communication is WhatsApp (58%) and the Google Classroom platform has been one of the most used by teachers (45%) to continue with the learning process. teaching and learning. The YouTube platform appears as the third tool in order of popularity (32%). The latter because a wide variety of explanatory videos can be found there, which is useful to complement the study of some topics; In addition, the platform allows the generation and distribution of new video materials, if necessary. It should be noted that the participants mentioned a considerable number of other tools, which leads one to think that the teachers took on the task of exploring various possibilities in search of the best alternative for each case, without limiting themselves to just using the most popular ones.

Regarding the ways of evaluating, it is observed that the tasks and the sending of evidence by various means has been the most frequently used option. However, this was not only done on digital platforms, but it was also necessary to go to the communities in person to send the printed booklets to parents and establish communication with them, as mentioned in the other strategies implemented.

As for the formative evaluation, it was implemented through participation and performance observation strategies, mainly through digital means. Sending homework and evidence also contributes to this dimension of the evaluation.

In addition to the above, it is observed that teachers resorted to a wide variety of summative evaluation strategies that range from the use of portfolios, projects, and gamification to the application of distance exams, betting on the idea that students are aware that it is they themselves who benefit from their own learning and skills developed.

On the other hand, it is noteworthy that some teachers stated that they did not carry out the learning evaluation in this period, which invites reflection on what the reasons would be for not having done it, although these are outside the scope of this work.

Regarding post-pandemic trends, Table 3 of the previous section shows that there is a certain inclination to continue using technologies soon, since a high percentage (96%) of participants indicated that it is "high" or "very high" the probability that they will continue to use technologies in their daily classes after the contingency.

In addition to the above, Table 4 shows that most teachers (51%) consider that they have achieved the proposed learning objectives or the desired competencies with their students at a medium level. Likewise, including the percentages of the "High" and "Very high" answers, 46% of the teachers consider that positive results were obtained with their students.

Taken together, the information that emerges from Tables 3 and 4 leads one to think that there is a high probability that, after the pandemic, teachers will continue to use the technologies they have learned to use, especially when time has been invested necessary to master them and the results obtained are considered satisfactory.

V. Conclusion
The educational scenarios derived from the confinement due to the COVID-19 pandemic have had to be abruptly modified and urgently adapted to a virtual modality to continue with the teaching and learning process, without educational institutions having enough time to prepare and adapt to the new reality, moving from traditional face-to-face environments to completely virtual environments. In particular, the ways of promoting and valuing learning have been crucial, placing the evaluation of learning as a sensitive issue that deserves to pay attention and reflect on its exercise, to consider actions that mark the course of future learning environments, in which the evaluation is carried out in an impartial and reliable manner.

Faced with the scenario described, the actions of multiple teachers are commendable, who, faced with the mandatory confinement and the sudden closure of schools, have turned to the search for new teaching strategies to implement immediately and be able to continue with their teaching work, which could be seen as a point in favor of education, if it is assumed that the teacher has had to see himself as a guide that requires leading the student towards the generation of his own knowledge, that is, the teacher has had to become in a learning facilitator to get the necessary information to the student in the best possible way and in the required time, trying to minimize the cases of abandonment and desertion.

The evolution of distance education is of vital importance to understand where and why we are today in the situation in which we find ourselves, since it contextualizes all those aspects that have marked the course of a type of education in which we currently we find ourselves immersed as teachers or as students.

In addition, it is observed that new educational scenarios are required, with innovative proposals that help the student to have a significant learning, there is talk of the integration of ICT in education when the educational system can provide that significant learning, product of experiences and I work reflectively. These conditions have led to think about the need for adequate training and professional updating in ICT, which allows teachers to face these challenges, with the development of innovative teaching practices, the use of tools that can strengthen their work in the classroom for the development of technological skills and competencies [6].

Under current conditions, it seems that virtual education is getting closer to being adopted with greater presence or perhaps permanently. Interaction and timely feedback are determining factors to achieve significant learning.

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