Virtual education: employment, citizenship and teacher autonomy

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Abstract

In the context of the pandemic that has forced online teaching, two variables are analyzed: training for employment and citizenship, and the impact of the use of information and communication technologies (ICT) on teachers' autonomy and the effectiveness of their teaching. This article reflects on how to reconcile training for employment and citizenship in a world where jobs are disappearing due to the automation of production and the use of educational software in the classroom. It is therefore necessary to prevent algorithms and computer programs from replacing content and didactics, and not to fall into technological determinism as a means of improving teaching. Thus, the aim of this paper is to promote citizenship education and to reflect on the use of ICT as a means and not as an end. The method of analysis is based on ethnography, as the researcher is part of the study and records data through participant observation in the daily life of the school. In addition, a detailed record of the observed events was kept in a field diary.

Keywords: digital competencies; ICT; training; autonomy

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Educación virtual: empleo, ciudadanía y autonomía docente

Resumen

En el marco de la pandemia que obligó a impartir clases en línea, se analizaron dos variables: la formación para el empleo y la ciudadanía, así como los efectos del uso de las tecnologías de la información y la comunicación (TIC) en la autonomía del docente y la eficacia de su enseñanza. En este artículo, se reflexiona sobre cómo conciliar la formación para el trabajo y la ciudadanía en un mundo en el que desaparecen empleos debido a la automatización de la manufactura y la utilización del software educativo en la enseñanza. Por lo tanto, existe la necesidad de evitar que los algoritmos y programas de cómputo sustituyan los contenidos y la didáctica, así como no caer en el determinismo tecnológico como medio para mejorar la enseñanza. Así las cosas, a través de este escrito, se pretende promover la formación ciudadana y reflexionar sobre el uso de las TIC como un medio y no como un fin. En cuanto al método de análisis, se basó en la etnografía, ya que el investigador es parte del estudio y registra los datos desde la observación participante en la cotidianidad escolar. Además, se llevó a cabo un registro detallado de los acontecimientos observados en un diario de campo.

Palabras clave: competencias digitales; TIC; formación; autonomía

Educação virtual: emprego, cidadania e autonomia do professor

Resumo

No contexto da pandemia que forçou o ensino on-line, duas variáveis são analisadas: a formação para o emprego e a cidadania e o impacto do uso das tecnologias de informação e comunicação (TIC) na autonomia dos professores e na eficácia de seu ensino. Este artigo reflete sobre como conciliar o treinamento para o emprego e a cidadania em um mundo em que os empregos estão desaparecendo devido à automação da produção e ao uso de software educacional na sala de aula. Portanto, é necessário evitar que algoritmos e programas de computador substituam o conteúdo e a didática, e não cair no determinismo tecnológico como forma de melhorar o ensino. Assim, o objetivo deste trabalho é promover a educação para a cidadania e refletir sobre o uso das TIC como um meio e não como um fim. O método de análise é baseado na etnografia, pois o pesquisador faz parte do estudo e registra os dados por meio da observação participante no cotidiano da escola. Além disso, um registro detalhado dos eventos observados foi mantido em um diário de campo.

Palavras-chave: competências digitais; TIC; treinamento; autonomia

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Introduction

Due to the severity of the COVID-19 pandemic, schools had to move to online education in order to continue students' education. One of the problems identified was the limited training of teachers in the use of information and communication technologies (ICT) to assume their role as facilitators in a virtual environment. Other difficulties related to the lack of infrastructure for Internet connection and the equipment needed to develop lessons. In the case of students, they mentioned the digital divide that marginalizes them from their education and the scarce use of software to support their learning, even though they are considered digital natives. In view of this situation, the need to promote the acquisition of digital literacy in the teaching profession was highlighted, since teachers are still considered fundamental to providing meaningful and quality teaching.

In the new scenario derived from the pandemic, the virtues of ICT, educational software and applications such as WhatsApp and Facebook, which speed up the teaching-learning processes, were emphasized. In this context, universities were faced with the challenge of training unknown skills and abilities; therefore, pedagogical models and didactics would have to be innovated with a deepening of the technologies used in education. Thus, ICTs emerged as a means to promote in students, among other things, the ability to work in interdisciplinary teams, to create and share information and educational content in interactive and dynamic formats, and to be active participants and protagonists of their own learning. In the background is the so-called knowledge society, to which schools must respond with their demands for digital literacy. It would be a teaching focused on service-learning, with a socially committed teaching staff that promotes the resilience of students in vulnerable situations (Álvarez and Varela, 2021).

In this context, there is no doubt that the digital age has changed everyday life, social relations and the direction of the economy. Higher education is required to train graduate profiles according to the essential performance in new technological jobs; in addition, with the pandemic, online classes have been promoted. The literature has highlighted the challenges for universities. Although the context is almost unprecedented, at least two constants remain: the shaping of the workforce, now 'digital', and the predominance of media and devices for teaching, rather than content, teaching didactics and students' willingness to learn. Thus, the governments propose as a panacea the training of teachers to transmit to new professionals the skills and values for the labor market and the possibility of innovating their practice thanks to ICT.

Regarding the task of teaching, there are already robots that read stories, teach programming and give English lessons to save teachers (Silva, 2018). However, the idea remains that teachers cannot be replaced because they have social skills, solve problems, negotiate and are creative. But, as Benhamou (2022) argues, AI is a threat to skilled professions that offer higher salaries thanks to their self-improvement to take on complex and non-routine tasks. In order to avoid an apocalyptic or science fictional stance, the discussion of the necessary digital literacy for employment will only present elements that include teaching and some activities performed by artificial intelligence (AI) in non-teaching education, such as administering tests, checking assignments, and taking attendance.

However, according to Sartori (1998), it is not the instruments that are objected to, but their contents and effects. For example, «Squarciafico, a man of letters, was opposed to the number of books that could be produced with the printing press because it weakened memory and the mind» (p. 30). If the printing press had been destroyed, the Encyclopedia, the foundation of the period known as the Enlightenment, would not have been published. Something similar is happening with the computer, which some call the new sovereign because it unites word, sound, and image, creating a virtual reality. Finally, the author criticizes that images reduce man's capacity for symbolic and conceptual abstraction. Without considering Sartori's position as an unquestionable truth, the visual culture in the classroom is increasing; writing is abandoned by taking a picture of the notes on the blackboard, and with audiobooks, the

student avoids reading. Although it is not the objective, in practice the use of the projector and the excess of videos in the classroom contribute to the passivity of the students.

Therefore, the purpose of this article is to explore and discuss the future of higher education, either by prioritizing the response to the employment needs of the digital age or by training for citizenship. This is followed by a reflection on the implications of the use of ICT and software for teaching, based on computational predictability and AI, in the context of the pandemic. It is argued that sometimes it is not perceived that the didactics of teachers are increasingly dependent on programs that work faster and more accurately when teaching online. In the conclusions, it is expressed the possibilities that training for work does not obscure the civic profile of the new professionals. It also highlights the importance of technology to support the work of teachers and maintain their autonomy in the face of algorithms.

Methodology

Ethnography was used to analyze the widespread use of software in schools. In view of the intensification of ICT use and the forced migration to online teaching, it is appropriate to ask, according to Erickson (1989): what is happening here? The aim is to observe, from a subjective point of view, a different way of interpreting everyday events in order to understand the meanings of educational practices for the research subjects. Ethnography is appropriate for the study of schools because the empirical data come from natural settings, recording events in field diaries from participant observation and interactions between subjects; moreover, it is characterized by the prolonged presence of the researcher (Restrepo, 2018), in this case in a Mexican university.

For Restrepo (2018), participant observation represents the 'Emic perspective', that is, from the inside, with the actor's own view of aspects of his or her social life. In this case, it involves the close observation of daily events recorded in field diaries. This interpretive approach does not seek absolute truth, as subjectivity

is the basis for analysis (Bertely, 2001). The transparency, objectivity and neutrality of the researcher, which are assumed to validate the scientific nature of a study, are replaced by the ethical stance and political commitment of the researcher to the situation under study.

Thus, the empirical part was collected while attending refresher courses and workshops such as Personal Learning Environment and E-4.0. In the field diaries, daily events were recorded and interpreted from a theoretical frame of reference (Woods, 2002). This is an instrument that describes in detail the events in the courses and the formative practice that describes, evaluates and explains the educational action and the group process. The virtual discussion forums made it possible to know the teachers' opinion on the use of ICT.

In terms of theoretical development, we searched Google Scholar for texts on the use of educational software. The interpretation considered the particular events - general context of teaching practice in the face of ICT and the economic, political and social demands of the Fourth Industrial Revolution. For the analysis of citizenship education and employment, the documentary review was used.

Results

In the context of the pandemic, investment in education is fundamental to reducing poverty, strengthening social mobility, achieving decent work and promoting economic growth in countries. Another objective of schooling is to promote the exercise of citizenship to combat poverty in Latin America and the Caribbean (United Nations, 2020), in the context of the inequality and poor quality of education present in the region's educational systems. It is therefore necessary to recover and transform education in line with innovations in the world of work (United Nations, 2020). If we consider the increasing robotization, automation and artificial intelligence in production, the controversy about the loss or creation of jobs, the improvement or intensification of work, the increase in remuneration or the precariousness of work opens up.

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In this scenery, there is a tension between the social perspective of education and the use of technology to provide the right skills for the digital society. According to Huepe et al. (2022), the current uncertainty in the world is partly generated by the digital revolution and the fourth industrial revolution: «The labor market of the future requires skills that are easily transferable between jobs and occupations and that respond to uncertainty and new technological and environmental demands» (p. 81). Similarly, digital literacy is key: «there are still unemployed people who have not been technologically retrained» (Laje-Terán et al., 2022, p. 342). Consequently, even if it is an art school, today information literacy, born in the seventies of the twentieth century, is imperative, understood as the ability to identify what information needs to be managed and analyzed critically and efficiently (Espinoza-Salazar and Tamariz-Nunjar, 2021).

Thus, achieving compatibility between training for employment and citizenship requires questioning the current socio-economic and political regime, reflecting on whether the entrepreneurial profile of graduates is compatible with the need to build a more caring society in order to mitigate the material inequalities of the population, and reflecting on how to reconcile the demands of the technological market with personal and community development, according to Bernard (2006), to understand that lifelong education does not end in school, that school systems should only focus on cost reduction, efficiency and flexibility, which discourages certification and public titles. So far, training for work is prioritized, but it is advisable to maintain the aspiration that teachers privilege training for participatory citizenship and, as Roose (2021) argues, the future involves not thinking about keeping jobs, but opposing the control of the mind and actions.

Benhamou (2022) presents some contrasts with AI: increased productivity, opening of new markets and jobs, innovation and elimination of repetitive tasks. On the other hand, he points to the dehumanization of interpersonal relationships, greater fragmentation of work, control of the collective of workers by algorithms, and increased anxiety. He emphasizes: «It would be a mistake to see these changes as inevitable; they are collective choices» (p. 7). According to Roose (2021), it is managers, not algorithms, who can measure the productivity of workers and decide whether to replace them with robots. Thus, during the pandemic, the automation of production and food delivery applications increased. Although it is argued that technology has always created more jobs than it destroys, for Rifkin (2020), investment in green energy and fuel disposal through the Internet of Things and the smartphone will create millions of jobs; the trend is to save human labor. Roose (2021) says that for Aristotle, automatic looms could reduce the demand for slaves; but in the 21st century, one candidate promised every American a thousand dollars to mitigate unemployment caused by automation.

Concerns about technological unemployment are therefore old and contradict the discourse of providing the most routine tasks. With AI, managerial positions, real estate agents and lawyers, among others, are already disappearing. This is the context of the higher education that young people are attending, and yet there is an insistence on the desirable civic education. It is hoped that the new professionals will not only focus on the labor market, but also contribute to solving social problems, especially social inequality, through their political participation. According to Bernate and Fonseca (2022), the training of a competent citizen to face technological challenges and computational thinking is a priority issue, in line with the workforce in the digital era.

Some effects of the technology on the teaching practice

In terms of teaching, based on empirical references and texts, it is possible to establish an acceptance of the modality and success in learning during the virtual classes in the framework of the pandemic. In conclusion, it is highlighted that students were able to acquire new skills, actively participate and enjoy the classes. Among the applications preferred by them and that optimized the teaching, we find WhatsApp and Facebook, (instant communication social networks that allowed immediate responses at any time and improved relationships with

teachers), Symbaloo (management service and links), Pearltrees (organization of content, notes and images from the network), Cmap (concept maps) and Canva (infographics).

Those who observe the integration of ICT in the classroom do so from a linear vision, which is summarized in the following idea: «Education systems around the world face the challenge of using technology to provide their students with the tools and knowledge necessary for everyday life in the 21st century» (Bernate and Fonseca, 2023, p. 227). For example, Forero-Corba and Negre-Bennasar (2024) observe important advances in the use of ICT in the classroom in relation to the Fourth Industrial Revolution, although with few nuances. Among them, Machine Learning (ML) or automatic machine learning stands out, which develops tasks typical of human beings, with implications for academic performance, school dropout and computational thinking.

In this sense, technological strategies and their devices, if used effectively, help reduce the educational gap and allow students to learn at their own pace or personalize their path with intelligent tutoring. Automated assessment can adapt content and didactics according to each student's learning profile.

In a course at a university in northern Mexico on E-4.0, in times of pandemic, there was a consensus that technology allows professors to maintain constant contact with students, accompanying them in a synchronous or asynchronous way through WhatsApp and the Teams platform. Teachers felt that technology could not be stopped and that ICTs, as a didactic support, facilitated the abandonment of traditional teaching methods. They also emphasized that online work favors the updating of knowledge, since it requires consulting several sites and sources, including YouTube. They affirmed that through Facebook, students respond faster and lose their fear of computers; they recognize their technological knowledge.

On the other hand, they shared didactic practices such as disguising themselves to achieve greater student participation without necessarily using technology. They argued that people are like a

copy of how computers work. No one discussed the possible loss of some of their own decisions when delegating certain tasks to technological programs. For Benasayag (2015), dealing with information stored in machines develops the brain less; moreover, computers are built to repeat identical signals without requiring understanding.

Discussion

According to the documentary review, governments and technology advocates provide extensive training for students. The context is inescapable: «The application of intelligent techniques in education is gaining ground at all levels of education» (Forero-Corba and Negre-Bennasar, 2024, p. 235). In this context, the idea of civic education is relegated to predicting favorable grades for students, balancing their current performance, their potential for success, identifying subjects for improvement, and deciding on their professional future. Del Campo et al. (2023) validate the application of technology and student preparation and its impact on the economy. Consequently, the teaching of mathematics, physics, programming and business skills has focused on brain training and learning simulations based on virtual reality and algorithms with machines that process and analyze information to make decisions like humans.

It is appropriate to demystify training for work in the context of the knowledge society and now in the Fourth Industrial Revolution. Sacristán (2013) reflects that texts about the knowledge economy, ICT and the Internet are observed with overflowing optimism in developed countries, but knowledge has always been the basis of all human activity; for example, Cro-Magnon man knew how to make stone axes and develop ways of life. Today, knowledge is oriented towards production and profit; therefore, a policy is needed to adapt schools to the digital age, without neglecting the education of citizenship, understood as the development of subjects who critically analyze and participate in the transformation of society. And, since it is not easy to reconcile these two objectives, vocational training is praised.

In this debate, the literature review suggests reflecting on whether competence and training with digital platforms and media and their complementarity with the pedagogical perspective is a fallacy. Pérez-Velasco (2023) points out that there are technologies for empowerment and participation that aim to increase educational skills such as autonomy, communication and teamwork. In addition, these technologies facilitate understanding, motivate students and encourage critical thinking in the context of digital literacy, which can be seen as a cultural invasion. On the other hand, the so-called knowledge economy has evolved into a behavioral economy based on user information. It is a matter of finding nuances and dimensioning the contributions of educational technology to the training of professionals in citizenship and the digital field.

Finally, the willingness of students to learn is fundamental; if there is no interest, it is not possible to educate. In the digital age, young people are adept at using devices and software, but they generally do not use them for learning, but for entertainment. Perhaps this is why they lack critical thinking and analytical skills (Espinoza-Salazar and Tamariz-Nunjar, 2021).

The necessary technological teacher training

The literature consulted and the trend in universities are oriented towards the unavoidable training of teachers in digital competences to optimize their communication, research, pedagogical and management skills. However, Silva (2022) and Bernard (2006) state that the training itself is produced by the person, not from the outside or only in relation to the market. The content and development of courses and/or workshops should be designed from the experience and specificity of the teaching profession. Training should not be instrumental or oriented only to the world of work, but should be related to global processes and their contradictions, understanding the political and economic processes that determine the current situation. The social commitment of teachers can be strengthened when they are the subject and not the object of their training.

Regarding the contrast between successes and obstacles in the use of ICT, the teachers' acceptance of updating computer programs and the importance of using ICT in the classroom is perceived. Currently, infographics and Canva are used more for presentations, and Kahoot is used to elaborate multiple-choice and opinion exams, since it is more playful and allows to review notes as if in a contest, which is considered motivating (Martin, 2019). Alvarez and Varela (2021) highlight the ICT of networking, the inverted classroom and blended learning. In this scenario, George et al. (2022) outline that digital competence is an asset that 21st century teachers must have and that they must become digital humanists to be successful in their work. The authors also include pedagogical and communicative aspects, but the focus is on technology management. Faced with these arguments, Aguerrondo et al. (2006) had warned against the extremes of ICT use: apology for cognitive development and new ways of learning versus apocalypse as depersonalization.

In contrast, there was stress, loss of contact with the student body, and problems with vigilance. The new responsibilities and demands resulting from the pandemic increased the amount of time teachers had to work in order to prepare lessons, connect adequately, and follow up with students in different formats. In particular, teachers perceived a decrease in the conditions for balancing domestic and pedagogical work. For them, working hours in the classroom, administrative and planning tasks, in addition to unpaid care work, were intensified (United Nations, 2020).

The Economic Commission for Latin America and the Caribbean (ECLAC), the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the United Nations Children's Fund (UNICEF) studied this aspect in six Latin American countries between 2019 and 2020, at the secondary level, pointing out that young people, regardless of their living conditions, show reluctance and lack of motivation towards distance learning. Some of the reasons for this attitude were the loss of the father's job, fatigue due to excessive time in front of the screen, and the lack of support to understand some subjects (Huepe et al., 2022).

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In the case of Mexico, unlike Maureira-Cabrera et al. (2020) and Suárez (2018), Villalpando (2021) shows several difficulties: barriers to socialization due to virtuality, problems with teamwork (not turning on the cameras and not knowing who is being trained) and disinterest in interaction. Other difficulties relate to barriers to connection, distraction of the student body with social networks, performing other activities during class and increased work time for class preparation and monitoring the tasks performed by the student body.

In an attempt to move away from the contradictions between apologists and apocalyptics, it is also not convenient to abandon a critical view of ICT and AI in education, both in production and in society. Consequently, González (2018) postulates the analysis of technological instrumentalization for social control and rejects the displacement of the human being in the act of thinking, designing and preparing messages by computers. In education, this means that teachers should not depend on technology and be convinced that the medium only has content when it is elaborated by a person. With regard to ICT, Bernard (2006) conceives it in the immediacy and as a position to consume free time, rather than for silence, reflection and analysis; he even gives it a more commercial than academic function.

Teachers do not simply resist change because of their skepticism about the use of ICT, but rather they observe the effects on people's autonomy. More than the instrument, it is interesting to reflect on its effects. Thus, it is appropriate to recall Fromm (1992), who alluded to humanized technology, stating that man is not just another cog in the machine, but an algorithm. He pointed out that the first industrial revolution replaced human and animal energy with mechanics, and the second replaced human thought. He also warned against prioritizing consumption, production efficiency, and the certainty of computer predictability that disregards human judgment, emotion, and choice. More recently, Sadin (2020) commented on new technologies, pointing out that truths are expected from automated interpretation, with algorithms that diminish the ability to make judgments.

Laje-Terán et al. (2022) argue that it is up to teachers to overcome digital illiteracy so that the virtual classroom promotes reflective thinking, interactivity and their work as tutors; they believe that they should be trained to improve their personal development, increase their productivity and be more diligent in their work, since students, observing these difficulties and shortcomings in the use of ICTs, express dislike for the didactics of teaching and lack of motivation for online sessions; they believe that training would help teachers to apply technological tools and innovate in the teaching-learning process. The pandemic has shown that online learning is here to stay because of its strength with ICTs (García and Ponce, 2021).

Conclusions

In the context of the COVID-19 pandemic, which forced schools to implement online classes, two key aspects were discussed: the formative demands of the Fourth Industrial Revolution to be taught by teachers, and the impact of the use of ICT on the didactic autonomy of teachers, where the tools seem to generate learning.

Thus, technology has been proposed as a tool for social change and as a builder of critical digital citizenship. There are nuances between the two existing poles, but the option of technological demands still prevails. It is not denied that political and cultural challenges underlie the impact of technologies on knowledge, society, economy and work (Nieto, 2020). There is no opposition to training for digital work, but rather a debate on the space to build a subject with a critical perspective on the world around him/her.

It is essential to understand that technology for teaching has several dimensions: from its support to improve learning and student autonomy, to how to respond to the saturation of stimuli from notifications on social networks and video games, which cause a detrimental effect on the capacity of comprehension and attention. The aim is not to diminish the progress made in university teaching, but to present nuances and other points of view to analyze the future of student education as a subject with a civic mindset and digital skills.

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With regard to the application of ICT in the classroom, it is insisted that teachers must be convinced that it is they who must maintain their autonomy, didactic capacity and decision-making in teaching. Animated sequences are not enough for students to learn more. Teaching involves affective and deliberative judgments in uncertain situations that cannot be found in any computer manual. The use of technology is not opposed, but the vision of the learner as an empty vessel is abandoned in order to fill it with knowledge that is only repeated and memorized.

We do not deny the use of ICT by teachers to teach, nor do we reject automated evaluation or intelligent tutorials that replace some assigned tasks, since they are means to increase the autonomy and creativity of teachers in terms of content and media, and to establish more flexible relationships in the classroom, both in face-to-face and virtual modalities; we argue that ICT and virtual teaching do not define the results of teaching, but rather the pedagogical approaches, content and social perspective of the teacher. It is not a matter of falling into extremes, but of determining what, why and for what purpose to use technology and educational commitments. It is important to be convinced that machines still require human action to function, and that in the classroom, decisions are based on moral judgments, not on predictive computing.

Conflict of interest

The author of this article declares that he has no conflicts of interest with the work presented.

References

Aguerrondo, I., Grinberg, S., Lugo, M. T., Marchesi, Á., & Martín, E. (2006). *La integración de las tecnologías de la información y la comunicación en los sistemas educativos* [The integration of information and communication technologies in educational systems]. UNESCO and Ministerio de Educación, Ciencia y Tecnología. Programa de Mejoramiento del Sistema Educativo, Argentina.

Álvarez, I. D. & Varela, C. (2021). Digitalización, compromiso y resiliencia. Proyecto de aprendizaje-servicio con futuros docentes [Digitalization, commitment and resilience. Service-learning project with future teachers]. *Edutec, Revista Electrónica de Tecnología Educativa*, (78), 85-98. https://doi.org/10.21556/edutec.2021.78.2233

Benasayag, M. (2015). *El cerebro aumentado. El hombre disminuido* [The Augmented Brain. The Diminished Man]. Paidós.

Benhamou, S. (2022). La transformación del trabajo y el empleo en la era de la inteligencia artificial: análisis, ejemplos e interrogantes [The transformation of work and employment in the era of artificial intelligence: analysis, examples and questions] [Documentos de proyectos]. Naciones Unidas. https://repositorio.cepal.org/server/api/core/bitstreams/586b344a-0dac-497c-9290-f8eb1a00221f/content

Bernard, M. (2006). *Formación, distancias y tecnología* [Training, distances and technology]. Pomares.

Bernate, J. A. & Fonseca, I. P. (2023). Impacto de las Tecnologías de Información y Comunicación en la educación del siglo XXI: Revisión bibliométrica [Impact of Information and Communication Technologies on 21st Century Education: Bibliometric Review]. *Revista de Ciencias Sociales (VE), 29*(1), 227-242. https://doi.org/10.31876/rcs.v29i1.39748

Bertely, M. (2001). *Conociendo nuestras escuelas. Un acercamiento etnográfico a la cultura escolar* [Getting to know our schools. An ethnographic approach to school culture]. Paidós.

Del Campo, G., Villalota, W., Andrade, E., & Montero, Y. (2023). Análisis bibliométrico sobre estudios de la neurociencia, la inteligencia artificial y la robótica: énfasis en las tecnologías disruptivas en educación [Bibliometric analysis of neuroscience, artificial intelligence and robotics studies: emphasis on disruptive technologies in education]. *Salud, Ciencia y Tecnología, 3,* 1-13. https://doi.org/10.56294/saludcyt2023362

Erickson, F. (1989). Métodos cualitativos de investigación sobre la enseñanza [Qualitative research methods on teaching]. En Witrrock, C. (coord.), *La investigación de la enseñanza II. Métodos cualitativos y de observación* [Teaching Research II. Qualitative and Observational Methods] (pp. 195-222). Paidós.

Espinoza-Salazar, L. I. & Tamariz-Nunjar, H. O. (2021). Autopercepción de la alfabetización informacional en estudiantes de una escuela de arte [Self-perception of information literacy in students of an art school]. *Horizontes, Revista de Investigación en Ciencias de la Educación*, *5*(21), 1470-1478. https://doi.org/10.33996/revistahorizontes.v5i21.289

Forero-Corba, W. & Negre-Bennasar, F. (2024). Técnicas y aplicaciones del Machine Learning e Inteligencia Artificial en educación: una revisión sistemática [Machine Learning and Artificial Intelligence techniques and applications in education: a systematic review]. *RIED, Revista Iberoamericana de Educación a Distancia*, *27*(1), 209-253. https://doi.org/10.5944/ried.27.1.37491

Fromm, E. (1992). *La revolución de la esperanza. Hacia una tecnología humanizada* [The revolution of hope. Towards a humanized technology]. Fondo de Cultura Económica.

García, B. & Ponce, S. (2021). El recuento de los daños, los aprendizajes generados por el COVID-19 y un día después. Reflexiones para México [Taking stock of the damage, lessons learned from COVID-19 and the day after. Reflections for Mexico]. In G. Guevara (coord.), *La regresión educativa. La hostilidad de la 4T contra la ilustración* [Educational regression. The hostility of the 4T against enlightenment] (pp. 291-316). Grijalbo.

George, C. E., Molina, I. A., & Uribe, A. P. (2022). La competencia digital docente que define al profesor humanista del siglo XXI [The digital teaching competence that defines the humanistic teacher of the 21st century]. *Transdigital 3*(6), 1-31. https://doi.org/10.56162/transdigital136

González, Á. (2018). McLuhan bajo la lupa [McLuhan under the microscope]. *Filosofía&CO.* https://www.filco.es/comprender-comunicacion-macluhan-bajo-lupa/

Huepe, M., Palma A., & Trucco, D. (2022). *Educación en tiempos de pandemia: una oportunidad para transformar los sistemas educativos en América Latina y el Caribe* [Education in times of pandemic: an opportunity to transform educational systems in Latin America and the Caribbean] [Serie Políticas Sociales]. Naciones Unidas.

Laje-Terán, C. D., Gualpa-Santana, M. D., & Zapata-Jaramillo, C. J. (2022). Analfabetismo digital docente en el proceso de enseñanza-aprendizaje de la Unidad Educativa San Carlos [Digital illiteracy of teachers in the teaching-learning process of the Unidad Educativa San Carlos]. *Maestro y Sociedad, 19*(1), 334-347. https://maestroysociedad.uo.edu.cu/index.php/MyS/article/view/5502

Martin, S. (2019). *Kahoot ¿Evaluamos o jugamos?* [Kahoot Do we evaluate or play?] Instituto Nacional de Tecnologías Educativas y de Formación de Profesorado. https://intef.es/wp-content/uploads/2019/10/Kahoot.pdf

Maureira-Cabrera, O., Vásquez-Astudillo, M., Garrido-Valdenegro, F., & Olivares-Silva, M. J. (2020). Evaluación y coevaluación de aprendizajes en blended learning en educación superior [Assessment and co-assessment of learning in blended learning in higher education]. *Alteridad, 15*(2), 190-203. https://doi.org/10.17163/alt.v15n2.2020.04

Naciones Unidas. (2020). *La educación en tiempos de la pandemia de COVID-19* [Education in times of the COVID-19 pandemic] [Informe]. https://repositorio.cepal.org/server/api/core/bitstreams/c29b3843-bd8f-4796-8c6d-5fcb9c139449/content

César Silva Montes

Nieto, C. (2020). Universidad, virtualidad y pandemia: una reflexión docente [University, virtuality and pandemic: a teacher's reflection]. In F. Costa y S. Garo (comp.), *Notas de pandemia*. *Reflexiones, lecturas y experiencias escritas en tiempos de aislamiento social y virtualidad* [Pandemic notes. Reflections, readings and experiences written in times of social isolation and virtuality] (pp. 21-28). Editorial Universidad Nacional del Rosario.

Pérez-Velasco, A. F. (2023). El uso opresivo del saber tecnológico en la educación. Una mirada crítico-social desde el desarrollo humano [The oppressive use of technological knowledge in education. A critical-social view from the perspective of human development]. *Revista Boletín Redipe, 12*(11), 63-88. https://doi.org/10.36260/rbr.v12i11.2041

Restrepo, E. (2018). *Etnografía: alcances, técnicas y éticas* [Ethnography: scope, techniques and ethics]. Universidad Nacional Mayor de San Marcos.

Rifkin, J. (2020). *El Green New Deal global. Por qué la civilización de los combustibles fósiles colapsará en torno a 2028 y el audaz plan económico para salvar la vida en la tierra* [The global Green New Deal. Why fossil fuel civilization will collapse by 2028 and the bold economic plan to save life on Earth]. Paidós.

Roose, K. (2021). *Future proof. 9 reglas para los humanos en la era de la automatización* [Future proof: 9 rules for humans in the age of automation]. Penguim Random House.

Sacristán, A. (2013). Sociedad del conocimiento [Knowledge society]. In A. Sacristán (coord.), *Sociedad del conocimiento, tecnología y educación* [Knowledge society, technology and education] (pp. 19-72). Morata.

Sadin. E. (2020). *La inteligencia artificial o el desafío del siglo. Anatomía de un antihumanismo radial* [Artificial intelligence or the challenge of the century. Anatomy of a radial antihumanism]. Caja Negra.

Sartori, G. (1998). *Homo videns. La sociedad teledirigida* [Homo videns. The remote-controlled society] (A. Díaz, Trad.)*. Taurus.

Silva, C. (2018). Perfil de egreso y empleo en el contexto del avance tecnológico [Graduation and employment profile in the context of technological progress]. *Pedagogía y Saberes* (48), 83-96.

Silva, C. (2022). Dos experiencias de formación docente universitaria en el contexto de la política educativa en México [Two experiences of university teacher training in the context of educational policy in Mexico]. In H. Olmeda (coord.), *Reflexiones en investigación educativa. Educando en el contexto de la pandemia COVID-19* [Reflections on educational research. Educating in the context of the COVID-19 pandemic] (pp. 22-43). Universidad de Tamaulipas.

Suárez, B. (2018). WhatsApp: su uso educativo, ventajas y desventajas [WhatsApp: its educational use, advantages and disadvantages]. *Revista de Investigación en Educación*, *16*(2), 121-135.

Villalpando, C. G. (2021). *Educación en tiempos de pandemia* Education in times of pandemic] (Vol. 2). Editorial Fontamara.

Woods, P. (1987). *La escuela por dentro. La etnografía en la investigación educativa* [Inside the school: Ethnography in educational research]*. Paidós.

Contribution

The author prepared, read and approved the manuscript.