Complex Digital Horizons in the Future of Education 4.0: Insights from UNESCO Recommendations

Horizontes digitales complejos en el futuro de la educación 4.0: luces desde las recomendaciones de UNESCO

María Soledad Ramírez-Montoya - *Tecnologico de Monterrey (México)*
Rory McGreal - *Athabasca University (Canada)*
Jane-Frances Obiageli Agbu - *National Open University of Nigeria (Nigeria)*

ABSTRACT

The complexity of constant change has a global impact on all sectors of society and especially in the field of education. This article aims to analyze the possible digital horizons that can be glimpsed in the future of education 4.0 based on UNESCO 2019 recommendations. The analysis is linked to the digital transformation and the valuable contributions of the articles that make up this monograph are also presented. The method followed was literature review and propositional analysis. The findings show contributions for education 4.0 linked to UNESCO recommendations: (a) reasoning for complexity, (b) access with open platforms, (c) digital support, (d) new creations and (d) solidarity. Ten articles that contribute to the knowledge of education 4.0, open educational resources, open science and digital transformation practices are also presented. The digital horizons outline processes for: (a) reconstructing the formative spaces of people; (b) glimpse education as part of a new inclusive ecosystem of training; (c) integrate open digital technology as a vehicle for new ideas and links; and (d) co-constructing new formative processes. The contributions are intended to be of value to the academic, scientific, and social community, interested in proposing new options for a quality, open, inclusive and supportive education.

Keywords: access to education; open educational resources; complexity; educational innovation; higher education; future of education.

RESUMEN

La complejidad del cambio constante tiene un impacto global en todos los sectores de la sociedad y especialmente en el ámbito de la educación. Este artículo pretende analizar los posibles horizontes digitales que se vislumbran en el futuro de la educación 4.0 a partir de las recomendaciones que emitió la UNESCO en 2019. El análisis se vincula con la transformación digital y se presentan también las valiosas aportaciones de los artículos que componen este monográfico. El método seguido fue la revisión bibliográfica y el análisis propositivo. Los resultados muestran aportes para la educación 4.0 vinculados con las recomendaciones de la UNESCO: (a) razonamiento para la complejidad, (b) acceso con plataformas abiertas, (c) soporte digital, (d) nuevas creaciones y (d) solidaridad. Además, se presentan diez artículos que contribuyen con el conocimiento de la educación 4.0, los recursos educativos abiertos, la ciencia abierta y las prácticas de transformación digital. Los horizontes digitales esbozan procesos para: (a) reconstruir los espacios formativos de las personas; (b) vislumbrar la educación como parte de un nuevo ecosistema inclusivo de formación; (c) integrar la tecnología digital abierta como vehículo de nuevas ideas y vínculos; y (d) co-construir nuevos procesos formativos. Las contribuciones pretenden ser de valor para la comunidad académica, científica y social, interesada en proponer nuevas opciones para una educación de calidad, abierta, inclusiva y solidaria.

Palabras clave: acceso a la educación; recursos educativos abiertos; complejidad; innovación educativa; educación superior; futuro de la educación.

How to Cite: Ramírez-Montoya, M. S., McGreal, R., & Obiageli Agbu, J.-F. (2022). Complex Digital Horizons in the Future of Education 4.0: Insights from UNESCO Recommendations. *RIED-Revista Iberoamericana de Educación a Distancia, 25*(2), pp. 09-21. https://doi.org/10.5944/ried.25.2.33843

INTRODUCTION

Whenever we read an article or book or even engage in conversation that concerns the uptake of digital technologies in education, the question that emerges is usually on the impact of these technologies on "the future". And that "future", without a specific time, is the one that should concern and occupy us. In fact, UNESCO's International Commission on the Futures of Education (2021) speaks in the plural of "the futures of education" to refer to "future scenarios" that identify promising ways to formulate policies and strategies that will shape desirable futures and redress past injustices. The social dynamics that have been built from the presence and use of digital technologies demand an accelerated analysis and implementation of teaching strategies that foresee a horizon in a precise future time so that, in this way, immediate solutions to the needs presented by the educational problems of our society can be addressed and begin to be provided.

The year was 2020 and the main issue that has had everyone on edge has been COVID 19; a disease that confronted us with a reality that illuminated the shortcomings of existing institutions. They should have been addressing the principal dimensions of human life such as health, education, and the environment. In addition, they should allow us to see how people have constructed an artificial perspective of their daily lives, hiding the real uncertainty that the future holds. There is a need for complex thinking to ensure a more realistic perspective on our present and possible future.

Two years have since passed, and it seems that the commitments, both individual and institutional, that were made to ensure that the behaviors and mechanisms that would transform this present into a better future for education seem to be fading away. Nature's call for our attention is beginning to be forgotten. This reality constrains us when developing activities related to training processes that take advantage of the structural impacts of the last two years (2020-2022). The gap between the use of digital technologies for the consumption of goods and services and the use of technologies in education has been shortened.

In this context, the *Ibero-American Journal of Distance Education* (RIED) reaffirms its commitment to new challenges. The journal continues to contribute to the international dissemination of the latest research and innovations in the field of open, flexible and distance teaching and learning, as well as technologies applied to education. This paper starts from considering complexity as key for outlining ideas of the future of education. Digital transformation is a driver of education 4.0, and so it is relevant to consider the recommendations of UNESCO on digitally-born open educational resources (OER). Valuable contributions are presented in this monograph which relates academic experiences that account for these realities. The paper ends with digital horizons, as an invitation to continue contributing to the open co-construction of the future of education.

THE FUTURE OF EDUCATION IN THE REALM OF COMPLEXITY

We believe it is important to re-emphasize the theme of "future" when we refer to education. Although we can speak and use the concept of future, the reality is that the actions that are carried out today in every educational process must be considered as future. Ball (2022) agrees that in order to re-imagine the future, one must look back to understand why schools are the way they are. Also inclusive is the training experiences of educators. It is also important to consider the broader

societal factors for implementing transformative change in education. This includes presenting challenges to curriculum, outcomes, and the education infrastructure (Fleener, 2022). For example, in the field of medical education, Shah et al. (2020) enunciates that many of the technological changes imposed so abruptly on the healthcare system by the COVID-19 pandemic may be positive and it may be beneficial if some of these transitions are maintained or modified as we move forward. Therefore, the horizon is not distant, but rather we place it in the present interaction between social actors with projection into the future.

In this projection of the future, the complexity of constant changes are factors to be considered. When Morin (2011), in the middle of the 20th century, referred to the complexity of thinking, he showed us a series of paths that began with the importance of evaluating the perspectives of the perceptions that we have been carrying for three centuries. He reiterated the need to rethink them and inaugurate new lines of thought that move us away from simplistic particularities and opaque generalities in watertight disciplinary compartments. The idea of complexity that we follow from Morin (2011) refers to the ability to be able to interconnect the various dimensions of reality. This could be compared to a fabric, composed of multiple tissues and, therefore, something complex. Tikly (2017). emphasizes understanding the effects of different types of power linked to broader global interests within a changing world order, in which education, and in particular learning, is linked to sustainable development. In the same vein Kaufmann et al. (2019) consider education in the context of making and unmaking sustainable futures and propose two interrelated aspects: creating spaces for reflection and emphasizing the political in educational environments.

Given the characteristics of today's society, it is necessary to reflect carefully on the information we receive. It is not a simple matter of understanding the processes of implementation of digital technology as a solution to the problems in education. The look should be oriented to everything that the formative processes entail from different perspectives that can be used to analyze the very fabric built in the processes of the use of digital technology in education. Jacobson et al. (2019) indicate how viewing education as a complex system, using the conceptual and methodological tools of complex systems, can help advance educational research and inform policy. We now know how complex learning is. Soudien (2020) establishes new insights that are based on a more complete understanding of the relationship between the biomedical and the social. It is necessary in this crisis and going forward, to deconstruct and make sense of the complexities of these realities to better understand the quality of the learning experience. Therefore, transdisciplinary makes even more sense as a form of organization that transcends disciplines so that scientific knowledge is nourished, while providing a global view that is not limited to the specificities of separate fields and that contemplates the world in its diverse unity in a dialogue with the diversity of human knowledge.

DIGITAL TRANSFORMATION AND EDUCATION 4.0

Digital transformation involves the integration of digital technology into all areas of an organization. This can fundamentally change the operation of education and the evolution of its components and systems, whether educational, technological or administrative. The effect of these changes on educational communities can be profound. The introduction of new technologies, social networks, big data, Internet of Things (IoT), etc. have impacted teaching and

learning in both face-to-face and distance (elearning, blended learning, mlearning) environments. The integration of ICT and technological tools in schools is a major challenge in the face of the new era of Education 4.0 systems (Ghavifekr & Wong, 2022). Advanced education, also called Education 4.0, and networked ecosystems are being implemented to develop skills and build competencies for the new era of manufacturing (Mourtzis et al. (2018). A route is offered by Taborda et al. (2021) in which functions, factors and substantive characteristics are interrelated to carry out an education 4.0 approach, in which digital transformation is explored from a systemic perspective, integrating the various factors impacting accreditation of academic programs. Education 4.0 can be presented as a means of addressing the complexities of digital transformation globally.

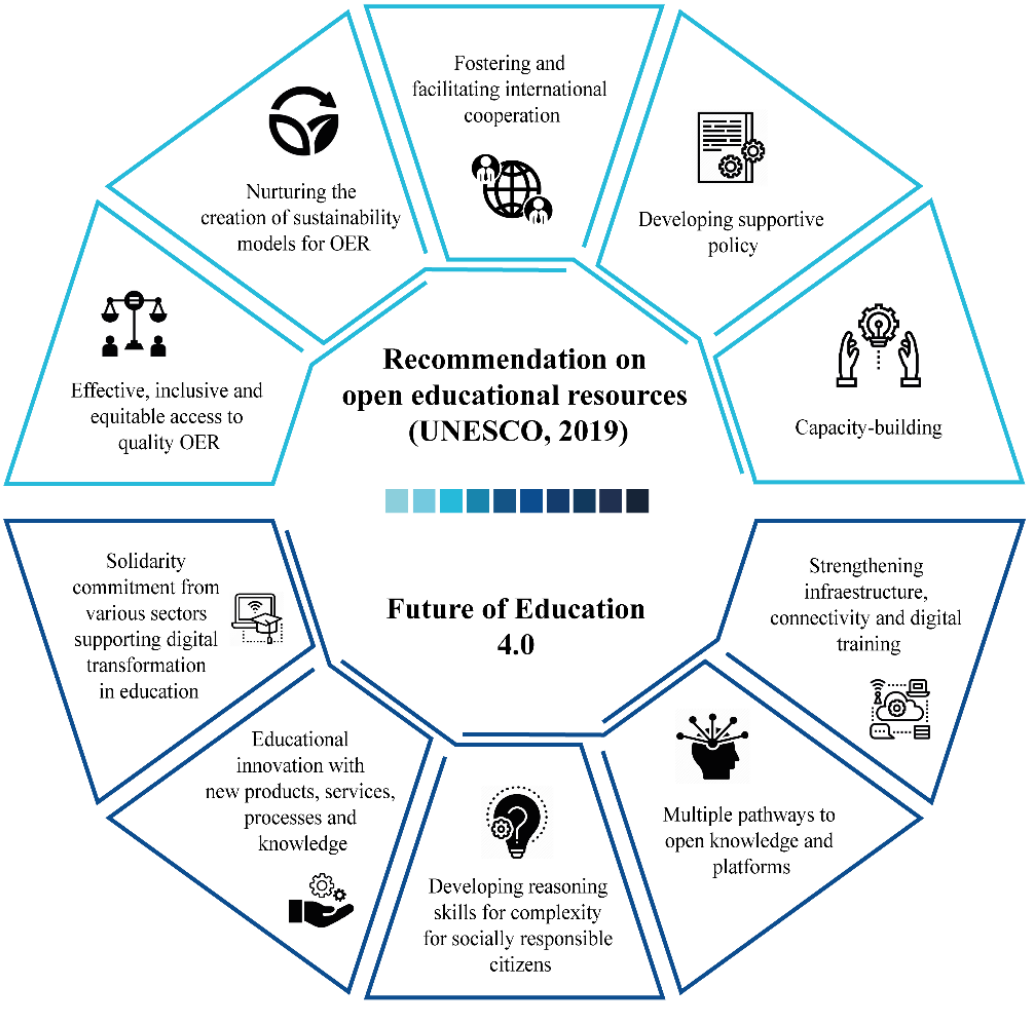
We understand digital transformation as the way in which society can begin to use, in the first 20 years of the 21st century, digital tools to effect the transformation from the analogical to the digital. This change impacts on social representations, supporting new forms of interaction, that besides affecting the type of relationships between people and institutions also can modify family relationships. The accelerated digital penetration loaded with information affecting people's lives has not the evolved the same in educational institutions, that "saw from the outside" how digitalization of society shaped new ways of thinking and acting. Digital transformation brings new products, processes, services, knowledge, distribution channels and/or supply chains to learning environments. Transformative changes are reflected in platforms, content, resources, assessment, management, and even alternative credentials. The changes require not only new infrastructure, but also training of both teachers and students in digital competencies that will support the new scenarios (academic, social, labor). In this regard, Bonfield et al. (2020) asked whether there opportunities yet to be explored and what impact this mighthave on how educators teach and deliver their curriculum in the future?

Education 4.0 can be seen as being nothing more than the way in which the educational community conforms directly or analyzes the digitization of education. Technological supports such as digital tools can be used for analyzing, evaluating, or generating content that contributes to the development of the bases of a new paradigm where "the act of thinking" becomes a central objective. Miranda et al. (2021) proposes four central components of Education 4.0 that will serve as a reference for the design of new educational innovation projects (i) Competencies, (ii) Learning methods, (iii) Information and communication technologies, and (iv) Infrastructure. Digital transformation is linked to the practices of education 4.0 where institutions apply new learning methods, innovative didactic and management tools, and intelligent and sustainable infrastructures complemented with emerging technologies that improve the processes of knowledge generation and information transfer. A space where the capacity to analyze the information (source, sender, message) that people receive is prioritized, allowing them to manage knowledge and transform it into ideas and actions in pursuit of a more just society both actively and proactively.

SOME LIGHT FROM THE UNESCO RECOMMENDATIONS

Digital transformation introduces a process of cultural, technological, and organizational change, supported by digital technologies. In the field of digital heritage, UNESCO (2009) mentions that it is made up of unique resources of human knowledge and expression and includes cultural, educational, scientific and administrative resources, as well as technical, legal, medical and other types of information created digitally, or converted into digital form from existing analog resources. Open education brings with it significant support for digital transformation, especially with the focus on the new UNESCO 2019 Recommendations: capacity development, development of supportive policies, effective, inclusive, and equitable access, and sustainability. These new Recommendations can support the development and sharing of open educational resources for the benefit of students, teachers, and researchers worldwide. These recommendations shed some light on Education 4.0 (Figure 1).

Figure 1
Highlights from UNESCO's recommendations for open educational resources.



Developing reasoning skills for the complexity of socially responsible citizens. Reasoning for complexity competences encompass critical systems, scientific and innovative thinking and aim to develop citizens who provide solutions for society (Ramírez-Montoya et al., 2022). UNESCO's (2019) recommendation refers to capacity building to develop the abilities of all key education stakeholders to create, access, reuse, repurpose, adapt, and redistribute OER, as well as to use and apply open licenses in line with national copyright legislation and international obligations.

Multiple pathways to open knowledge and platforms. Open access to knowledge requires platforms, tools and resources to expand learning opportunities. UNESCO recommendations encourage governments, education authorities and education institutions to adopt regulatory frameworks that support open licensing of publicly funded educational and research materials and develop strategies to enable the use and adaptation of OER for inclusive, high-quality education and lifelong learning for all, supported by relevant research in the field.

Strengthening infrastructure, connectivity and digital literacy. The response of institutions to the COVID pandemic highlighted the lack of connectivity and infrastructure services to support learning processes, as well as the need for digital training for the academic community to continue with the processes. It will be of substantial importance to address UNESCO's recommendations to promote the adoption of strategies and programmes, in particular through relevant technological solutions, to enable OER to be shared in any medium, using open formats and standards, with a view to maximizing equitable access, co-creation, preservation and searchability, including by persons with disabilities and those belonging to vulnerable groups.

Educational innovation with new products, services, processes and knowledge. The generation of new options that involve integrating novelties in problematic or challenging situations can support the improvement of educational processes. The recommendations invite the creation of sustainability models for OER at national, regional and institutional levels, as well as the planning and piloting of new sustainable forms of education and learning.

Solidarity and engagement of diverse sectors supporting digital transformation in education. Collaborative and supportive growth and collaboration can enrich the options for digital transformation. UNESCO's recommendations call for the creation of a global pool of culturally diverse, locally relevant, accessible, gender-sensitive, multilingual and multi-format educational materials. So, international partnerships can contribute to the processes of quality, inclusive education and lifelong learning opportunities.

CONTRIBUTIONS OF THE MONOGRAPH

Against this backdrop, this monograph presents contributions with new educational practices and research that support the growth and projection of education, digital transformation, and Education 4.0 within the framework of UNESCO's new recommendations for OER and Open Education.

González-Pérez, Ramírez-Montoya and García-Peñalvo contributed to Emerging Technologies 4.0, boosting open education and science linked to the UNESCO 2019 recommendations. The results support the need to increase open access culture, promote international cooperation, co-create knowledge, create

OER and open educational practices. The data supporting the study were contributed through a far-reaching international formative experience.

Fidalgo-Blanco, Sein-Echaluce and García-Peñalvo, posited an Education 4.0 method to improve learning, with four components: Cloud Computing infrastructures (applied in the COVID-19 confinement period), hybrid active methodologies (applicable in the classroom, online and blended learning modes), technologies (through a technological ecosystem) and horizontal 4.0 competencies. This model supported the improvement of learning outcomes and favored peer learning.

A prominent and emerging area is provided by Weber and Skyer, in the field of inclusive education for deaf students. Aesthetic ways of knowing and deaf-positive design operations were explored along with OER. The findings show that deaf curriculum design is an educational issue embedded in a broader policy debate about methods and philosophies of pedagogy.

Nova-Nova, Tenorio-Sepúlveda and Muñoz-Ortiz analyzed the results of a binational course for the production of OER in response to the UNESCO Recommendation on OER. The course was generated from the international UNESCO/ICDE Open Educational Movement for Latin America 2019. The course was given in three Mexican institutions and one in Chile, with 81 professionals (teachers from different educational levels and instructors) who helped to confirm that there is still a need to raise awareness on how to share OER to increase the dissemination of knowledge and contribute to open education.

With a different approach in the field of access to knowledge, Sanabria Zepeda, Molina Espinosa and Vycudilíková Outlá worked on the concept of Citizen Science, promoting the development of competencies that help to face the complexity that surrounds them and to respond with practical solutions to the problems of their environment. The article presents an overview, critique, composition and prognosis of some of the most relevant themes, frameworks and conjectures framed by UNESCO's Open Science provision on Citizen Science.

Builes Morales, Esteve Mon, Sánchez-Tarazaga and Arroyo Ainsa, analyzed digital perspective in the teaching competency frameworks in Higher Education in Spain. The objective was to know the digital perspective that is raised in the different frameworks of teaching competences in Higher Education in Spain during the last 20 years. The results show the predominance of the instrumental sense of digital transformations in the teaching function, intimately linked to the teaching-learning process and the need for transformation and innovation in teaching.

The digitalization of the University is the focus of the contribution of Romero-Rodríguez, Hinojo-Lucena, Aznar-Díaz and Gómez-García, who analyzed the influence of Covid-19 on the learning of university students in Andalusia, and how psychosocial variables have been influenced (fear of Covid-19, life satisfaction, stress, uncertainty); learning variables (learning strategies, motivation, time and study habits, facilitating conditions, self-regulation); and sociodemographic factors (sex, age, course, home address, scholarship, future employment, mobility, dropout). 1873 university students contributed to the study to advance knowledge about the impact of Covid-19 on university learning.

Similarly, Pérez-Garcias, Tur, Darder Mesquida and Villatoro Moral posited successful strategies of flexible learning pathways in learning design. The aim of flexible learning pathways is to allow students' choice so that they can build their own pathways by selecting their options according to their own individual needs,

motivations, and prior knowledge. The study investigated learning pathways and sequences and collected data on student satisfaction through an online survey. The authors emphasize the need to address current digital challenges from equitable and fair approaches; and, also, on the value of the teacher's role as a designer.

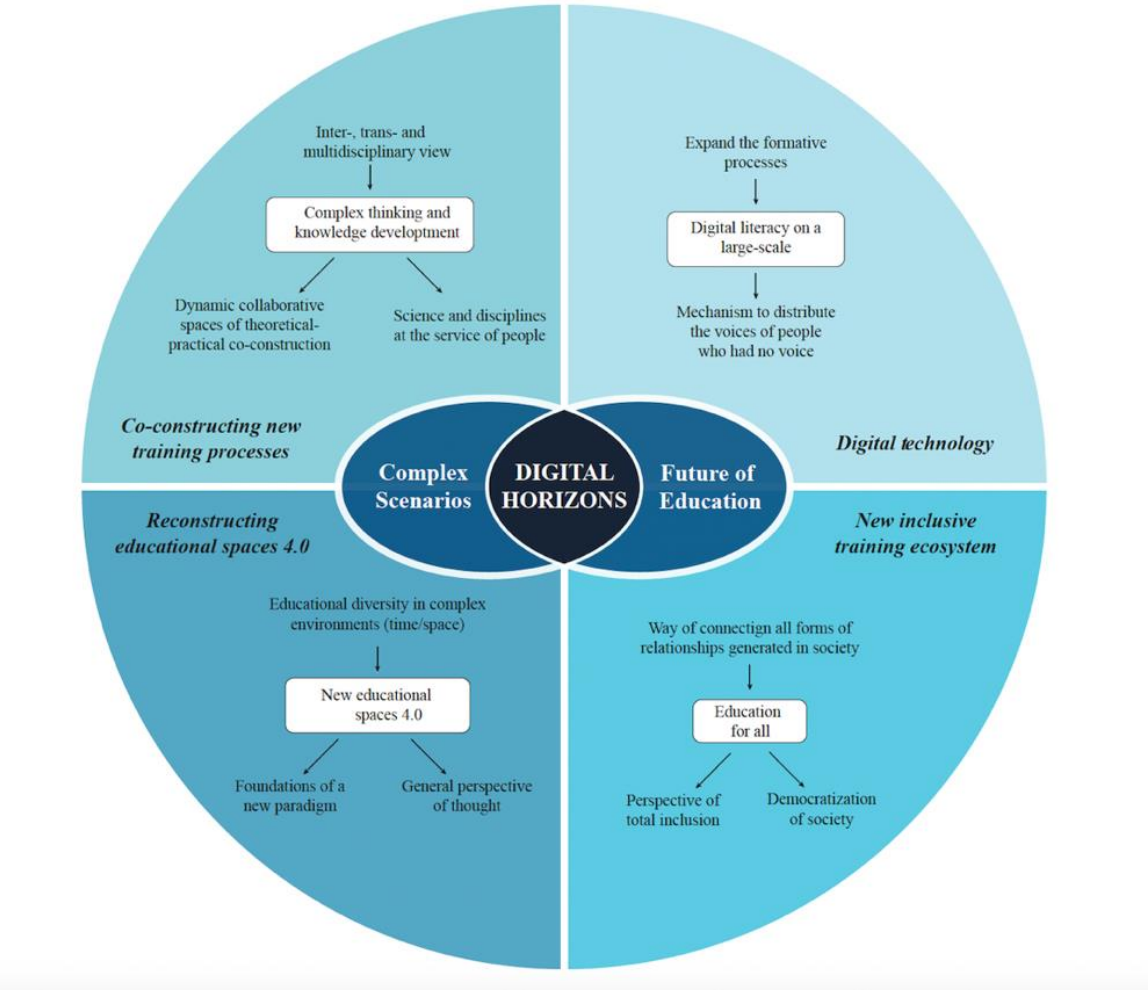
Another study of learning itineraries is provided by Orcos Palma, Jiménez Hernández and Magreñán Ruiz, who worked on mathematical probability with future teachers in an online scenario with the DeckToys tool. The results obtained were statistically very satisfactory, as were the qualitative results in terms of improving understanding, of both the procedures and the concepts involved in time management, since the students were able to work efficiently at their own pace.

The monograph closes with an interesting contribution from Ortega Ruipérez, exposing the role of metacognitive strategies in blended learning. The results show that the use of metacognitive strategies has especially facilitated the organization of homework in terms of study habits and that it has a significant weight, so these findings suggest the inclusion of metacognitive strategies in blended learning to improve study habits and reading comprehension in students.

DIGITAL HORIZONS FOR THE FUTURE OF EDUCATION

Digital horizons, as a set of possibilities or perspectives that are envisioned in the future of education, intersect with complex scenarios and education 4.0, generating lights for possible reconstructions, ecosystems, openings and co-creations (Figure 2). Of great importance is to visualise new inclusive scenarios, where technology is integrated into diverse communities, such as people with disabilities (García-Peñalvo et. al., 2022) or in different modalities, both face-to-face and distance (García Aretio, 2021); with accessible and flexible designs (Antón Ares, 2018), providing security and accessibility to information (Bartolomé & Lindín, 2018) and with attention to sustainable development goal number 4 of UNESCO's 2030 agenda, which calls for educational opportunities for all, of quality, supported by digital technologies.

Figure 2
Digital horizons for the future of education



Reconstructing people's educational spaces. We have already stated that the paradigm that placed the old school in society has been with us for more than three centuries. It is now becoming urgent to define and build new educational spaces (once again we question the word “future”, considering that the training/instruction of people already exists without attending a specific location or time). In the 21st century, there are signs of a move away from education tied uniquely to institutional dimensions of action, and, towards one that prioritises a general perspective of thought supporting the foundations of a new paradigm (building by building) that contemplates diverse spaces and times for education, in complex environments.

Education as part of a new inclusive training ecosystem. Rather than defining an educational institution as a closed space for acquiring knowledge, we must see it as a backbone and/or generator of community processes and phenomena. Education can serve as a means of connecting all forms of relationships generated in society with a perspective of total inclusion. As a result, education can continue to serve as a support for the utopia of the democratization of society, and as an active laboratory of new social practices that enrich the initial curriculum and organically establish new knowledge and ways of thinkin**g**

Digital technology as a vehicle for new ideas and links. Digital technology has become the new way of establishing interactions between people and institutions. This possibility opens more than ever the option of implementing it as a valid mechanism to enhance the voices of people who had no voice. It is essential to expand the formative processes of digital literacy on a large-scale, taking advantage of the "coercive" inertia that COVID 19 generated between 2020 and 2022. The opening up of knowledge as a common good, has led to the expansion of training possibilities and social impact.

Co-constructing new training processes. Faced with the emergence of new realities in institutions: family, work, economy, it is necessary to rethink and develop or adopt new content and ways of establishing training processes. We must create dynamic collaborative spaces of theoretical-practical co-construction to develop thinking and knowledge. To this end, it is necessary to start acting without compartmentalizing science and disciplines and to place them at the service of people. An inter-, trans- and multidisciplinary view will allow us to see people within a large ecosystem, without limits, to understand the extent of their interactions as biological, spiritual and social entities. People are now interacting in complex scenario worlds.

Acknowledgement

This publication is a collaborative work of UNESCO and ICDE Chairs. It is also linked to the projects: "Open and inclusive education: WUN and UNESCO training & research networks", funded by the WUN network and "STEAM-OER-LATAM Community Project, funded by Siemens Stiftung. The authors gratefully acknowledge the support of UNESCO, ICDE and the funding agencies, as well as that of the project participants.

REFERENCES

Antón Ares, P. (2018). Red openergy: experiencias formativas e investigadoras para el diseño instruccional accesible. Openergy network, training and research experiences for accessible instructional design. *Education in the Knowledge Society (EKS),* 19, 31–51. https://doi.org/10.14201/eks2018194

Ball, D. L. (2022). Reimagining American Education: Possible Futures: Coming to terms with the power of teaching. *Phi Delta Kappan, 103*(7), 51-55. https://doi.org/10.1177/00317217221092236

Bartolomé, A., & Lindín, C. (2018). Posibilidades del Blockchain en Educación. *Education in the Knowledge Society (EKS), 19*(4), 81-93. https://doi.org/10.14201/eks2018194 8193

Bonfield, C. A., Salter, M., Longmuir, A., Benson, M., & Adachi, C. (2020). Transformation or evolution? Education 4.0, teaching and learning in the digital age. *Higher Education Pedagogies, 5*(1), 223-246. https://doi.org/10.1080/23752696.2020.1816847

Fleener, M. J. (2022). Blockchain Technologies: A Study of the Future of Education. *Journal of Higher Education Theory & Practice, 22*(1). https://doi.org/10.33423/jhetp.v22i1.4956

García Aretio, L. (2021). Can We Trust Evaluation in Distance and Digital Education Systems? *RIED-Revista Iberoamericana de Educación a Distancia,* *24*(2), 9-29. https://doi.org/10.5944/ried.24.2.30223

García-Peñalvo, F. J., Van der Roest, H. G., & Ottoboni, G. (Eds.). (2022). Using Technology to Combat Diseases and Help People With Disabilities. *Frontiers in Psychology, 13*, 854762. https://doi.org/10.3389/fpsyg.2022.854762

Ghavifekr, S., & Wong, S. Y. (2022). Technology leadership in Malaysian schools: The way forward to education 4.0–ICT utilization and digital transformation. *International Journal of Asian Business and Information Management (IJABIM), 13*(2), 1-18. https://doi.org/10.4018/IJABIM.20220701.oa3

Jacobson, M. J., Levin, J. A., & Kapur, M. (2019). Education as a complex system: Conceptual and methodological implications. *Educational Researcher, 48*(2), 112-119. https://doi.org/10.3102/0013189X19826958

Kaufmann, N., Sanders, C., & Wortmann, J. (2019). Building new foundations: the future of education from a degrowth perspective. *Sustainability Science, 14*(4), 931-941. https://doi.org/10.1007/s11625-019-00699-4

Miranda, J., Navarrete, Ch., Noguez, J., Molina-Espinosa, J. M., Ramírez-Montoya, M. S., Navarro-Tuch, S. A., Bustamante-Bello, M.R. Rosas-Fernández, J.B., & Molina, A. (2021). The core components of education 4.0 in higher education: Three case studies in engineering education. *Computers & Electrical Engineering, 93*, Art 107278. https://doi.org/10.1016/j.compeleceng.2021.107278

Morin, E. (2011). *La vía: para el futuro de la humanidad*. Grupo Planeta.

Mourtzis, D., Vlachou, E., Dimitrakopoulos, G., & Zogopoulos, V. (2018). Cyber-physical systems and education 4.0–the teaching factory 4.0 concept. *Procedia manufacturing, 23*, 129-134. https://doi.org/10.1016/j.promfg.2018.04.005

Ramírez-Montoya, M. S., Castillo-Martínez, I. M., Sanabria-Zepeda, J., & Miranda, J. (2022). Reasoning for Complexity in the Framework of Education 4.0. *Journal of Open Innovation: Technology, Market, and Complexity*. https://doi.org/10.3390/joitmc8010004

Shah, S., Diwan, S., Kohan, L., Rosenblum, D., Gharibo, C., Soin, A., Sulindro, A., Nguyen, Q., & Provenzano, D. A. (2020). The technological impact of COVID-19 on the future of education and health care delivery. *Pain physician*, S367-S380. ID: covidwho-979310. https://doi.org/10.36076/ppj.2020/23/S367

Soudien, C. (2020). Complexities of difference and their significance for managing inequality in learning: Lessons from the COVID-19 crisis. *Prospects, 49*(1), 59-67. https://doi.org/10.1007/s11125-020-09486-x

Taborda, M. L. N., Coello, J. G., Salazar, J. T., & Morán, J. (2021, November). Digital transformation model in the evaluation of engineering programs from an education 4.0 approach. In *2021 International Symposium on Accreditation of Engineering and Computing Education (ICACIT)* (pp. 1-5). IEEE. https://doi.org/10.1109/ICACIT53544.2021.9612494

Tikly, L. (2017). The future of education for all as a global regime of educational governance. *Comparative Education Review, 61*(1), 000-000. https://doi.org/10.1086/689700

UNESCO (2009). *Charter on the Preservation of the Digital Heritage*. UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000179529.page=2

UNESCO (2019). *Draft recommendation on Open Educational Resources* (OER). https://unesdoc.unesco.org/ark:/48223/pf0000370936

UNESCO (2021). *Los Futuros de la Educación. Aprender a convertirse*. Comisión Internacional sobre los Futuros de la Educación UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000375746

Fecha de recepción del artículo: 13/05/2022
Fecha de aceptación del artículo: 18/05/2022
Fecha de aprobación para maquetación: 18/05/2022