Transforming dialogic education combined with the vision of complexity: the experience of open schooling in Project CONNECT

A educação dialógica transformadora aliada à visão da complexidade: a experiência de escolarização aberta no Projeto CONNECT

Transformar la educación dialógica combinada con la visión de la complejidad: la experiencia de la escolarización abierta en el Proyecto CONNECT

MARILDA APARECIDA BEHRENS [a]

PATRÍCIA LUPION TORRES [b]

Abstract

This paper was borne around Project CONNECT, which is based on the concepts of Open Schooling, Open Education, Open Educational Resources and Practices (OER and OEP), and Creative School. These innovative topics in participatory qualitative research are grounded in Edgar Morin's conceptions of the vision of complexity and in Paulo Freire's dialogical education to epistemologically support the formative processes of open schooling in Project CONNECT. Open schooling and the application of OER and OEP in creative schools support educational processes for a form of citizenship that is oriented toward planetary consciousness. At this phase of Project Connect, the research problem was: How to use OER to encourage students to act as scientists in the wake of local and global issues surrounding COVID-19, mediated by a co-creation process with teachers/researchers, for the purpose of stimulating the production of knowledge? The general objective was to elaborate OER in a co-creation process in a research group to support teachers in encouraging students to exercise the role of scientists in emerging issues such as COVID-19. The results showed that the teachers and students of the two schools involved in the participatory educational process were able to reflect, problematize, and develop projects and make use of the collaborative construction of OER with topics related to scientific knowledge, in this case,

[a] Pontifícia Universidade Católica do Paraná (PUCPR), Curitiba, PR, Brasil. Doutora em Educação, e-mail: marildaab@gmail.com

[b] Pontifícia Universidade Católica do Paraná (PUCPR), Curitiba, PR, Brasil. Doutora em Engenharia de Produção, e-mail: patricia.lupion@pucpr.br

COVID-19. In this way, the participants could begin to become aware of their social responsibility as active citizens in the care and preservation of life and the planet.

Keywords: Complexity. Teacher education. Education quality. Dialogical education.

Resumo

Este artigo foi gerado em torno do Projeto CONNECT, o qual envolve como base os conceitos de escolarização aberta, educação aberta, recursos e práticas educacionais abertas e escola criativa. Esses temas inovadores da pesquisa qualitativa participante fundamentaram-se nas concepções de Edgar Morin sobre o a visão da complexidade e de Paulo Freire sobre a educação dialógica, como sustentação epistemológica dos processos formativos de escolarização aberta do referido projeto. A escolarização aberta e o uso de REAs e PEAs em escolas criativas se apresentam como subsídios aos processos de formação para a cidadania com vistas à consciência planetária. Nessa etapa do Projeto CONNECT, o problema investigado foi: como provocar os estudantes, por meio de REA, para o exercício do papel de cientistas em temas emergentes da sociedade local e mundial, mediado pelo processo de cocriação de professores e pesquisadores, com fins de realização de registros de produção de conhecimento? O objetivo geral foi elaborar REAs, em processo de cocriação em um grupo de pesquisa, como subsídios aos docentes das escolas envolvidas, com a intenção de levar os estudantes ao exercício do papel de cientistas em temas emergentes, como a Covid-19. Os resultados mostraram que professores e alunos das duas escolas envolvidas no processo de formação participante puderam refletir, problematizar e desenvolver projetos, além de usufruir da construção colaborativa de REAs, com temáticas ligadas aos conhecimentos científicos, no caso, a Covid-19. Assim, os participantes puderam começar a tomar consciência de sua responsabilidade social como cidadãos protagonistas no cuidado e na preservação da vida e do planeta.

Palavras-chave: Complexidade. Qualidade da educação. Formação de professores. Educação dialógica.

Resumen

Este artículo fue producido en torno al Proyecto Connect, que se basa en los conceptos de Escolarización Abierta, Educación Abierta, Recursos y Prácticas Educativas Abiertas y Escuela Creativa. Estos temas innovadores de encuesta cualitativa participativa se fundamentaron en las concepciones de Edgar Morin sobre la visión de la complejidad y Paulo Freire en la educación dialógica, como soporte epistemológico de los procesos formativos de escolarización abierta del Proyecto Connect. La escolarización abierta y el uso de REA y PEA en escuelas creativas se presentan como subsidio a los procesos de formación para la ciudadanía con la finalidad de una conciencia planetária. En esta etapa del Proyecto Connect, el problema investigado fue cómo provocar los estudiantes, por medio de Rea, a ejercer el rol de científicos en temas emergentes de la sociedad local y global, sobre covid19, mediados por el proceso de co-creación de profesores/investigadores, a fin de realizar registros de producción de conocimiento? El objetivo general fue elaborar REAS, en proceso de co-creación en un grupo de investigación como subsidios a los docentes de las escuelas involucradas, con la intención de llevar los estudiantes al ejercicio del rol de científicos en temas emergentes como Covid19. Los resultados indicaron que docentes y alumnos de las dos escuelas involucradas en el proceso de formación participativa pudieron reflejar, discutir y desarrollar proyectos y pudieron aprovechar la construcción colaborativa de REA, con temas vinculados a los conocimientos científicos, en caso de COVID 19, así los participantes pudieron comenzar a tomar conciencia de su responsabilidad social como ciudadanos protagonistas en el cuidado y preservación de la vida y del planeta.

***Palabras clave**: Complejidad. Calidad de la educación. Formación de profesores. Educación dialógica.*

Introduction

The topic of this study was based on the centenary authors Edgar Morin and Paulo Freire, who dedicated themselves to finding innovative and meaningful approaches to education throughout their academic lives. Because of the relevance of their works and their worldwide representation in education, they merit investigation with epistemological, ontological, and methodological propositions that can provide answers for the challenges of the 21st century in all areas of knowledge.

From this perspective, we chose the centenarian Edgar Morin, who was born in Paris, France, in 1921 and celebrated his 100th birthday in 2021, for this study. He is distinguished because he published relevant studies throughout his academic life, especially about the necessary reform in thought toward a paradigm shift in education.

This research also associated the studies of the centenary Brazilian author, Paulo Reglus Neves Freire, who was born in Recife, Brazil, in 1921. He passed away in 1997, but his ideas are alive and sow hope for dialogical, critical, fraternal, and egalitarian education. In 2021, Freire's centennial birthday was celebrated with events all over the world, which demonstrates the respect for and impact of the works that made him famous as the only Brazilian educator who is honored worldwide and known in five continents.

Edgar Morin's and Freire's historical denunciations of conservative schools

The model of conservative schools has been historically constituted for 400 years since the 17th century to attend to a positivist, Cartesian conception that is focused on a rational, objective view of knowledge, its reproduction, and the memorization of contents. With this challenge in mind, we examined Freire's explicit denunciation of the banking model of education and Morin's proposition based on his warning about the shortcomings of the simplifying, disciplinary paradigm that still maintains an active presence in our schools at different levels of education.

The term "simplifying paradigm" by Edgar Morin (2000) indicates a conception that generates pedagogical approaches based on a disciplinary, fragmented perspective focused on reason. It reflects a teaching position that defends absolute and

unquestionable ideas, which become reductionist, and it welcomes learning practices based on the reproduction of knowledge and the repetition of content.

Within the simplifying (MORIN), banking (FREIRE) model of conservative schools, teaching is based on rational and objective processes, generally based on pedagogical practices that focus on reading textbooks and doing repetitive exercises. This school is modeled after the paradigm of science, which defends scientific views based on proven truths since the 17th century. In the process, it has contaminated education and schools and removed all processes that involve subjectivity in a bid to support Cartesian, Newtonian thought, which focuses on constructs and knowledge separate from any emotional, sensitive, and subjective view that is present in the universe. In this conservative conception, whatever cannot be proved has no scientific validity. Therefore, researchers and teachers work with absolute and unquestionable truths.

This denunciation is contemplated by Morin (2005) at different times but is notable in *Science avec conscience*, wherein he argues that science cannot be restricted to fragmented knowledge which considers the parts without understanding the whole, which focuses on objectivity in static proposals and repetitive exercises that satisfy the Cartesian paradigm. However, this simplifying, reductionist conception is no longer justified given society's demands in the 21st century. As Morin (2008, p. 15) warns, "[...] fragmented and isolated thinking allows specialists and experts to perform well within their compartments, to cooperate effectively in non-complex sectors of knowledge, notably those concerned with the functioning of artificial machines." He further adds that the logic that scientists, researchers, and teachers "[...] obey to extends the constraints and inhumane mechanisms of the artificial machine and its deterministic, mechanistic, quantitative, formalistic vision to society and human relations; and it ignores, hides, or dilutes everything that is subjective, emotive, free, creative."

The paradigm shift is also advocated by Capra (1997), Boaventura Santos (1989, 2021), and Morin (2000, 2001, 2005, 2007) when they note from the beginning of the 20th century and especially in the beginning of the 21st century the urgency for Science, education, and humanity to reform their thought, to recognize the living universe, which is not static, which changes every second and is in constant transformation, and which directly influences the lives of human beings, animals, forests, and other living beings in nature and on the planet.

In the same vein, Freire (1987, 1992, 1996), denounces the banking model of education and urges for its necessary abandonment. For Freire (1987), the banking model of education is the idea that a teacher can mechanically deposit content in the students' heads without contextualization, without making sense of the content, for the purpose of having students memorize and reliably repeat the information without discussion and, oftentimes, without understanding the meaning.

The conservative banking model of education embraces an authoritarian and oppressive attitude from the teacher towards the student. Accordingly, this vision only emphasizes an indoctrination of the mind, the reproduction of knowledge, and the student's obedience. As stated by Freire (1987, p. 82), it prioritizes "[...] the act of depositing, transferring, transmitting values and knowledge [...]," and the objective of this practice is the transmission and assimilation of knowledge.

Freire's (1987) denunciations are known worldwide and point to a society that presents an oppressive education. These ideas are presented in different works but are noteworthy in *Pedagogy of the Oppressed*, which has been translated into 37 languages and is known in five continents. The work exposes the relationship between the oppressor and the oppressed at different social levels but is dedicated to describing its harmful effects on education. With this denunciation and others in relevant works, Freire became a world-renowned author, distinguished by the relevance of his books and lectures, and has been named as one of the five most popular authors in education worldwide. Paulo Freire was awarded the title of Patron of Brazilian Education and received titles and honors in American, European, African, and Asian universities. He thus became such an important citizen of the world that he never tired of saying that his ideas were not meant to be copied, but to be reflected upon, transformed, rewritten, reconfigured, and recreated.

Freire's banking concept (1987), which is connected to the Cartesian, simplifying view proposed by Morin (2000), urgently needs reconsideration in order to overcome the mechanical, reductionist view originating from the scientific paradigm, which is reflected in education and teaching practices that are based on repetitive activities in the classroom that restrict students to listening, reading, memorizing, and repeating information. According to Moares (2021, p.28):

> The education that has been promoted, heir to the mechanistic, Cartesian paradigm, continues to separate the soul from the body, reason from feeling, knowledge from affection. In this sense, it presents itself as a castrating, incomplete education as it denies the possibilities of knowledge and the development of one of the most essential dimensions that characterizes us as people: we are affectionate, caring, and loving beings.

These denunciations impel us to investigate potential approaches to overcome this reality experienced in the world of science and education and to propose an epistemological change arising from the simplifying, banking model of conservative schools. Therefore, our research incorporated the studies, foundations, constructs, and knowledge defended by Morin's vision of complexity (2000, 2001, 2007) and Freire's dialogical education (1987, 1992, 1996) to form the epistemological and methodological basis that can support an innovative educational process for teachers and students.

Approaching paradigm shifts in education according to Freire and Morin

Associating Morin's and Freire's contributions allows us to foresee a promising and relevant paradigm for education. However, this process requires understanding what constitutes a paradigm, as explained by Moraes (2021, p.81) in the following:

> A paradigm brings a theoretical perspective, a philosophical stance that underlies the methodological strategies adopted and provides a certain context and a certain rationale for the development of research as well as actions, values, and a worldview.

For Freire and Morin, the paradigm shift implies seeking processes that lead the teacher to perceive that a whole exists and that its parts urgently need to be reconnected, to overcome the fragmented, disciplinary vision and move toward a way to create a meshwork of multiple dimensions: emotional, cognitive, ethical, aesthetic, political, cultural, social, ecological, and others. It is about awakening self-awareness in the teacher so that they may transform themselves and their surrounding reality as a teacher and as a person.

The positivist, Cartesian paradigm, which urgently needs to be overcome, has led to a reconsideration of the treatment that men and women received in different levels of education. It was loaded with objectivity, while subjective characteristics, sensibility, and spirituality were suppressed. Thus, the focus was ultimately to have, accumulate, and get rich at any price without any consideration of the impacts of extracting riches from nature and the harmful effects to oneself, to one's community, and to the planet. By focusing on a capitalist vision of having, they have moved away from being. According to Cardoso (1995, p. 31), "[...] knowledge and action are oriented [along this direction] by reason and experimentation, thus revealing the cult of the intellect and the exile of the heart."

These denunciations mobilize researchers from all over the world to search for another conception of education that incorporates a broader and more meaningful, loving, and supportive vision.

Throughout his entire life, Paulo Freire defended an educational model that involved dialogue, accepting differences, and the inclusion of marginalized people, and that considered the student to be an active participant and creator of their own history. His work focuses on critical and reflective education that does not dichotomize theory and practice and that welcomes methodologies based on problematizing situations and considers inclusion and diversity, promoting social justice and defending a person's and the world's humanization processes.

Freire (2016) related his studies to adult education, addressing topics that involved learning and popular awareness, in particular, along with his lived experiences in the literacy of rural workers, which generated relevant ideas about oppression, about the life of layers of marginalized people, about the hardships imposed on men and women who work in the field, among others. The author's categorical contributions to education in

general are undeniable, especially in reference to the teacher's dialogical and loving relationship in *Pedagogy of Freedom*. In this book, he criticizes the traditional teaching models and reinforces the need for an education based on ethics, respect, dignity, and the learner's freedom.

Morin's centennial struggle involves a mobilization to reform thought, to search for a vision of man, woman, and the world that begins to consider a great gathering of human beings to welcome a planetary consciousness that preserves, values, and responsibly uses natural resources and finds ways to live harmoniously on the planet in this process of solidarity. To this end, men and women need to stop thinking they are the center of the universe, according to Morin (2021, p.24): "The Western myth of man whose destiny is to become 'lord and master of nature' needs to give way to an ecological consciousness [...]." Thus, the universe must be considered as a whole that goes beyond the domain of men and women. It includes multiple beings that inhabit the planet and natural phenomena that need to be preserved. Humanity needs to understand that it shares space with animals, plants, forests, microbiological beings, and other components of the Earth-Homeland that must co-exist harmoniously, considering the triangle of life: individual, society, and nature.

Invited by UNESCO, as an educator with a future vision, Morin (2000) prepared *Les Sept Saviors Nécessaires à l'Education du Futur*, wherein he presents significant contributions that drive the urgency for the shift in thought and in the paradigm of education. He proposes seven knowledges that are indispensable to discussing and advancing the educational process: (i) the ignorance of knowledge: error and illusion; (ii) the principles of pertinent knowledge; (iii) teaching the human condition; (iv) teaching earthly identity; (v) facing uncertainties; (vi) teaching understanding; (vii) ethics of humankind.

With this challenging vision, Morin (2000) indicates that the black holes that exist are oftentimes ignored, rather than unidentified, because of a mechanical and reductionist vision of the Universe. The challenge is further heightened as the fragmented, disciplinary approach hinders the development of individuals who are prepared to face emerging problems and are capable of thinking, creating, doing, feeling, being, living with cultural diversity, multidimensionality, plurality of ideas, a holistic vision, and the broad and unrestricted inclusion of all individuals without discrimination by race, gender, culture, religion, among other issues at the root of local and planetary crises. For Morin (2021), it is about humanizing humans.

From this perspective, teaching needs to be based on dialogue, respect, solidarity, tolerance and welcoming diversity and developing sensitivity. It demands learning and teaching the human condition through a process of construction and reconstruction that takes humanity along another path that "[...] shows and illustrates a human being's multifaceted destiny: the human species' destiny, the individual's destiny, social destiny, historical destiny, all the intertwined and inseparable destinies" (MORIN, 2000, p. 61).

Following the approaches proposed by Freire and Morin, in *Paradigma educacional ecossistêmico: por uma nova ecologia da aprendizagem humana* (Ecosystem educational paradigm: towards a new ecology of human learning,), Moraes (2021, p.73) warns:

> As humanity, if we want to build a new civilizational pact to preserve life, to develop another consciousness of planetary citizenship that is capable of ensuring the restoration of ecological systems and the survival of all species, including humans, we need a radical change in the foundations of knowledge and learning we work with in education.

The survival of humanity and of all other species that inhabit the planet demands the preservation of life on the Earth-Homeland, as proposed by Morin and Kern (2001). This requires educational processes at different levels and in different spaces which consider the urgency of a planetary consciousness that moves quickly toward a supportive, fraternal, egalitarian, fair education, wherein people, other beings, and nature are esteemed as unique and valuable.

The pursuit toward a planetary consciousness needs to incorporate a broader vision of ecology which involves both preserving rivers, forests, and natural resources and considering the environment as a whole.

Similarly, Paulo Freire (1993) always emphasized the urgency of defending social justice as one of the missions of the educational process. He points to education for citizens filled with indignation towards the social injustices in society and to protecting every citizen's fundamental rights as a viable approach.

Sustainable Development Goals and Project CONNECT: approaches to establish the paradigm of complexity and transformative dialogical education

The paradigm shift, especially towards a complex and transformative vision, demands actions that urgently generate a planetary consciousness at both local and global levels.

The emerging challenge is understanding that caring for our common home, the EARTH-HOMELAND, as Morin (2001) calls it, also means caring for humanity, for ourselves as individuals, for our fellow human beings, and for all beings that inhabit the planet.

Global awareness movements have emerged to meet the Sustainable Development Goals (SDGs), which demanded national and international mobilization and commitment from leaders of different countries in an agenda which was agreed upon

during the United Nations Sustainable Development Summit in September 2015. It lists a series of key issues to ensure the sustainability of life on the planet. This agenda includes 17 goals and 169 targets to be met by 2030.

These goals can only be achieved to the extent that they are immediately put into practice, and this movement depends on each and every citizen.

On the United Nations' website, Brazil has indicated that "the Sustainable Development Goals are a global call to action to end poverty, protect the environment and the climate, and ensure that people everywhere can enjoy peace and prosperity." These are goals that no single nation can achieve alone. However, this movement towards the planet's sustainability implies a reform in thought, according to Morin (2000), which leads to overcoming the Cartesian conception that led science and education for three hundred years to a reductionist, fragmented, and mechanical view of living in the universe and to welcoming a complex paradigm that makes sense, that reconnects knowledges in pursuit of a holistic view which transforms, realigns, and has meaning in the preservation of humanity itself.

In the same measure, no nation can fulfill its role in conquering this challenge if it does not involve all of its segments to collectively and personally commit to actively transforming its surroundings and understand the urgency of considering its function in the world (FREIRE, 2016). The current moment demands a paradigmatic shift in attitude that sets humanity before this challenge personally and collectively and that aims to develop the subject's role as the creator and transformer of their reality.

The purpose of Project CONNECT's open component developed for the schools involved in the research, is intended to contribute to taking a position on the individual and collective role of subject that they – so important segments of society – are responsible for.

Edgar Morin's Theory of Complexity and Freire's Transformative Dialogical Education formed the epistemological basis for the actions developed in the research activities.

The methodological basis was tied to the *Base Nacional Comum Curricular* (Brazil's National Common Core Standards) – BNCC (2019, p. 1), which highlights "the organic and progressive set of essential learning competencies that all students should develop throughout the stages and modalities of Basic Education [...]" and defines ten general competencies of Basic Education, as presented in the following table.

Table 1 - General competencies of basic education

GENERAL COMPETENCIES FOR BASIC EDUCATION
1. Value and use historically constructed knowledge about the physical, social, cultural, and digital world to understand and explain reality, continue learning, and contribute to the construction of a fair, democratic, and inclusive society.
2. Exercise intellectual curiosity and apply the typical scientific approach, including research, reflection, critical analysis, imagination, and creativity, to investigate causes, develop and test hypotheses, formulate and solve problems, and create solutions (including technological solutions) based on knowledge in different areas.
3. Value and appreciate various local and global artistic and cultural manifestations and participate in diversified practices of artistic and cultural production.
4. Use different languages – verbal (oral or visual motor, such as Libras, and written), physical (body language), visual, auditory, and digital – as well as knowledge of artistic, mathematic, and scientific languages to express and share information, experiences, ideas, and feelings in different contexts and produce meanings that lead to mutual understanding.
5. Understand, use, and create digital information and communication technologies in a critical, meaningful, reflective, and ethical way in various social practices (including scholastic practices) to communicate, access, and disseminate information; produce knowledge; solve problems; and exercise leadership and responsibility in personal and collective life.
6. Value the diversity of knowledge and cultural experiences that enable them to: understand work relations; make choices aligned with active citizenship; and live their life project freely, independently, critically, and responsibly.
7. Make arguments grounded in reliable facts, data, and information to formulate, negotiate, and defend common ideas, points of view, and decisions that respect and promote human rights, social and environmental awareness, and responsible consumption in local, regional, and global settings and maintain an ethical stance towards self-care and caring for others and the planet.
8. Know and appreciate oneself and care for one's physical and emotional health by understanding oneself in human diversity and recognizing one's own emotions and those of others with self-criticism and the ability to deal with them.
9. Exercise empathy, dialogue, conflict resolution, and cooperation by showing respect for others and promoting respect for human rights and welcoming and valuing the diversity of individuals and social groups, their knowledge, identities, cultures, and potential without any form of prejudice.
10. Act personally and collectively with autonomy, responsibility, flexibility, resilience, and determination by making decisions based on ethical, democratic, inclusive, sustainable, and supportive principles.

Source: – BRASIL. *Base Nacional Comum Curricular* – BNCC (2019), Emphasis added by the authors.

These competencies are consistent with the *CADERNO DE EDUCAÇÃO EM DIREITOS HUMANOS - Educação em Direitos Humanos: Diretrizes Nacionais* (HUMAN RIGHTS EDUCATION BOOKLET - Human Rights Education: National Guidelines), which states that "education must affirm values and encourage actions that contribute to society's transformation to make it more humane and socially just and to focus on the preservation of nature as well" (BRASIL, 2013, p.50).

The interconnected concepts explained in various national documents can contribute to a synergy between public policies that seeks alignment with the United Nations' (UN) 2030 Agenda.

Adopting principles that incorporate the topics proposed by the 2030 Agenda is only possible in light of a complex vision within a model of dialogical education. To

achieve autonomy in the various spheres of open education, orienting coherent pedagogical actions is essential. To this end, transdisciplinarity is proposed as the epistemological basis for this discussion. According to Torres and Behrens (2021, p. 19):

> The paradigm shift in science influences all areas of knowledge, especially education. Today we are experiencing a general and deep ecosystemic crisis that affects all relations with life, society, and the family. It is a global crisis, and the evolution of educational, social, ethical, moral, and spiritual dimensions has not accompanied scientific and technological development. Humanity urgently needs to find ways to embrace new, more comprehensive and profound ontological, epistemological, and methodological approaches.

By adopting a complex vision in an open schooling process, we intend to break from traditional pedagogical approaches that divide curricula into structures compartmentalized into disciplines. In other words, this process in itself encompasses the perspective of transdisciplinarity.

Although much is discussed about the principles of "transversality," in practice, its effective transposition still occurs in few educational institutions. One of the difficulties of this transposition lies in the mistaken association of the perspectives of "transversality" and "interdisciplinarity" as a strategy of mere content integration. With the perspective of open schooling in Project CONNECT, there is the real possibility of implementing a transdisciplinary model that involves the various players inside and outside the school.

With open schooling in Project CONNECT, we tried to overcome this impasse when we adopted a theoretical conception centered around a complex view of "transversality," which goes beyond the simple integration of content and is concerned with articulating the practice in a methodology that is coherent with the conception. According to Okada, Da Rosa, and Souza (2020, p. 4):

> [...] Open schooling is designed to integrate formal and informal learning by using student-centered methods, such as projects based on learning, community, problem solving, and participatory action research, that consider the important issues of the world. The goal is to enable all students to develop relevant knowledge, skills, and attitudes.

With this innovative perspective in this open schooling model, it is necessary to embrace a more innovative conception that involves an alliance between Morin's paradigm of complexity (2000, 2001, 2007), in defense of reconnecting knowledges and a holistic vision, and Freire's transformative dialogical education (1987, 1992, 1996), based on the promotion of dialogical and critical relationships that embrace the collective vision in educational processes, among other assumptions.

Open Schooling, Creative School, and Project CONNECT

The first records of open education processes are associated with vocational training. In the late 1960s and early 1970s, open education expanded with the European movement that resulted in the creation of open universities in several countries. The topic is under discussion again with the advent of the internet, which has enabled the exchange of information and the emergence of numerous educational opportunities developed in a network.

In the digital age, the concept of open education has been associated mainly with Massive Open Online Courses (MOOC), open-source software, open archives, Open Educational Resources (OER), open access, and open science. However, open education can take on many different formats at different levels and in different educational contexts.

"The term open education is used in various contexts, involving a range of practices, some more traditional and some more recent; it is not exclusive to the use of open educational resources" (SANTOS, 2012, p.71). There are closed courses that make use of open educational resources, so the use of an OER is not what characterizes a course or program as open.

The concept of open education is directly linked to the concept of flexible education. The question posed for the development of an open education action is the level of flexibility that will be given to produce this action. Thus, to plan an open education action, it is necessary to define its level of flexibility and answer the following questions: who, why, what, how, where, when, what support, how to evaluate, and how to certify.

The concept of open education is still linked to: the question of gratuity, which favors universal access and no costs; the question of free content, in the same sense that OER or open-source software can be used, repurposed, and modified; and the question of openness, in the sense of general, unrestricted inclusion, that is, no formal certifications required that would prevent access to all individuals. (DOWNES, 2013)

Thus, open educational practices (OEP) are another concept related to open education, which are understood as recommendations from the OPAL report (2011, p. 13)

> [...] a set of activities around instructional design and implementation of events and processes intended to support learning. They also include the creation, use, and repurposing of open educational resources (OER) and their adaptation to the contextual setting.

Open Educational Practices (OEP) favor exchanges between professionals involved in the teaching-learning process who benefit from this collaborative act of co-

creation supported by the concept of sharing, shared learning, and disseminating knowledge. According to EHLERS (2011, p.3), OEP are:

> [...] practices that support (re)applying and producing OER through institutional policies by promoting innovative pedagogical models and respecting and empowering students as co-creators in their lifelong journey of learning.

Inclusive and creative practices built collaboratively and shared openly should be encouraged and aimed toward an innovative model for education that corresponds to a transformative and complex view of the world. To build a creative school, it is necessary to ensure the processes of co-creation and the exchange of activities developed in partnership with the various players involved. Suano (2016, p. 82) answers the question about why we need a creative school by highlighting the need to have a schooling space that does not maintain the traditional educational model that remains in force today.

In response to the need to overcome a traditional educational model, which does not meet the needs of the contemporary world, open schooling presents itself as an alternative. It allows for the development of a creative and accessible school for everyone. This idea is supported by Freire (1992), who always defended accessible and open schooling for everyone.

An open school is a school "that motivates teachers to teach with creative freedom that inspires their students to be better people, to exceed themselves," a school that also "motivates them to study with the desire to learn something about life for life, that works beyond the disciplines and perceives human relations in all areas of the educational, social, ecological, and planetary sphere," but, mainly and fundamentally, a school that "meets the educational needs of a citizen who transforms their reality [...]." (SUANO, 2016, p. 82)

The open schooling scenario proposed in Project CONNECT is an investigation into the "approach promoted by the European Commission to prepare students in cooperation with partners to develop projects on actual global issues and build a desirable future together" (OKADA et al., 2020, p.1). Through collaborative and investigative practices, open schooling involves students in activities that address social, economic, environmental, and educational issues related to the student's reality.

Project CONNECT involves seven countries and ten organizations. It aims to encourage children and young people in basic education to aspire to a scientific career and to apply scientific thinking in their daily lives. This project already involves teachers and students, but it is developed with the involvement of companies, professionals, scientists, universities, communities, and families so that students may understand what a scientist does. The project also aims to get the scholastic community to discuss science with their family and friends and to critically evaluate the impact of science in the world.

Project CONNECT (2020) is:

> [...] a project funded by Europe under the Horizon 2020 Science with and for Society program. It aims to support secondary schools in adopting open education, integrating action science into the basic curriculum, and utilizing participatory science with families, universities, and businesses.

Project CONNECT is under development, and it is set out to involve approximately 50,000 students in 300 schools and 700 STEM (Science, Technology, Engineering, and Mathematics) professionals, as well as companies, communities, families, and researchers, with the support of the institutions involved. Because this is an open schooling experience, anyone interested can become part of this network to share and disseminate science.

Project CONNECT is based on three pillars: open schooling, action science and participatory science. Open schooling attempts to create flexible, inclusive, and integrated environments in schools and universities in online, hybrid, or in-person modalities. Action science focuses on practical classroom activities which demonstrate to students that science can affect their lives and that they can use it to achieve a positive impact. The third pillar aims to provide students with opportunities to interact with scientific professionals and discuss topics onscreen with their families (PROJETO CONNECT, 2020).

To support the activities developed in the partner schools of Project CONNECT, two research scenarios were organized: a structured scenario with pre-defined activities tied to the curriculum and an open scenario with structured activities based on a pre-developed model with its own creation. All the materials developed in the project, the guidelines, and some practices will be shared on an online platform to allow access to teachers and institutions from different countries. (PROJETO CONNECT, 2020).

The methodological model was designed in a way so that the stages could contribute to planning and structuring the teachers' actions with the inclusion of the community, the family, scientific professionals, and other invited players. These positions originate from the discussion over Project CONNECT's epistemological approach, which involves working with the transformative dialogical view proposed by Freire (1992) and humane education that has meaning, as proposed by Morin through the paradigm of complexity, which proposes a reform in thought and a reconnection of knowledges in pursuit of a holistic view. Thus, the teachers and students involved are initiated with a new view of Science, the scientist's role, and, in turn, of how scientific knowledge is created. To meet this conception, Project CONNECT was structured in three phases: Care-Know-Do (in Portuguese, *cuidaremos-sabemos-fazemos*). In the first phase, "We Care" (in Portuguese, *Nós Cuidamos*), challenges are proposed by professionals and family. In the second phase, "We Know" (in Portuguese, *Nós Sabemos*), the student's understanding and scientific skills are developed. Finally, in the third phase,

"We Do" (in Portuguese, *Nós Fazemos*), students transform their knowledge and skills into action science (PROJETO CONNECT, 2020).

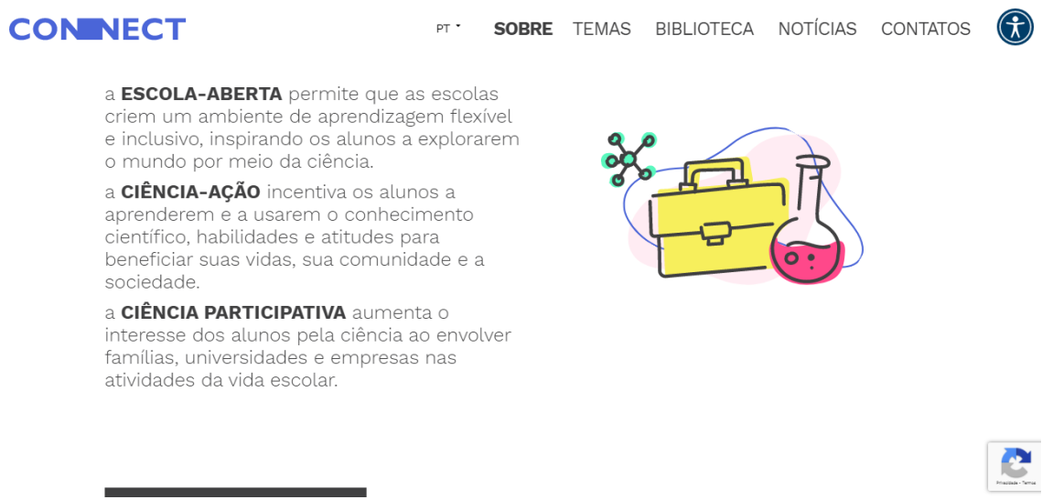
In a project like CONNECT, first and foremost, everyone has a role to play. Therefore, everyone is responsible for playing their role in the best possible way as they follow the development of the roles assigned to others in the collective.

Lived experience of producing OER and OEP in a research group in the first year of Project CONNECT

This experience was developed in 2021 in partnership with European and Brazilian universities as part of the activities in Project CONNECT. In particular, this research group conducts their activities in a Graduate Program in Education at a large university in southern Brazil.

In this phase of Project CONNECT, the research problem was how to apply OER to encourage students to exercise the role of scientists in emerging local and global issues regarding COVID-19, mediated by a co-creation process with teachers/researchers, for the purpose of registering the production of knowledge. The general objective was to elaborate OER in a process of co-creation in a research group to support the teachers of the schools involved and to encourage students to exercise the role of scientists in emerging issues such as COVID-19. The sample presented herein consists of OER and OEP that were developed with a participant methodology in a process of co-creation and integration among the players involved in this first year of Project CONNECT. In this project, one company participating in the research consortium developed a platform (https://www.connect-science.net/pt-pt/) to access information on the project and to share the experiences and practices of the research groups involved. On this platform, it is possible to access information about the project at the local and global level and the results to support the teachers of the schools involved in the project, as shown in Figure 1.

Figure 1 – Project CONNECT's Main Pillars



Source: https://www.connect-science.net/pt-pt/about-the-project/

This platform was conceived as a collaborative space to allow for exchange between the players involved, and it aggregates a network of participants who collaboratively share their experiences, practices, and results for use, (re)use, and adaptation. To play the role of scientists, students are encouraged to look for emerging local and global issues to record the production of knowledge according to the rules of scientific methodology. In this initial phase, the topic COVID-19 was chosen to elaborate the OER and make them available to the teachers and students of the schools involved in order to support discussions about the topics.

Figure 2 exhibits the front page of Project CONNECT:

Figure 2 - Front page of Project CONNECT's Platform

Source: https://www.connect-science.net/pt-pt/.

In this first year of implementation, the participants of the research group involved in Project CONNECT created the first OER about COVID-19. Figures 3 and 4 present two examples of these OER that are available on the CONNECT Platform

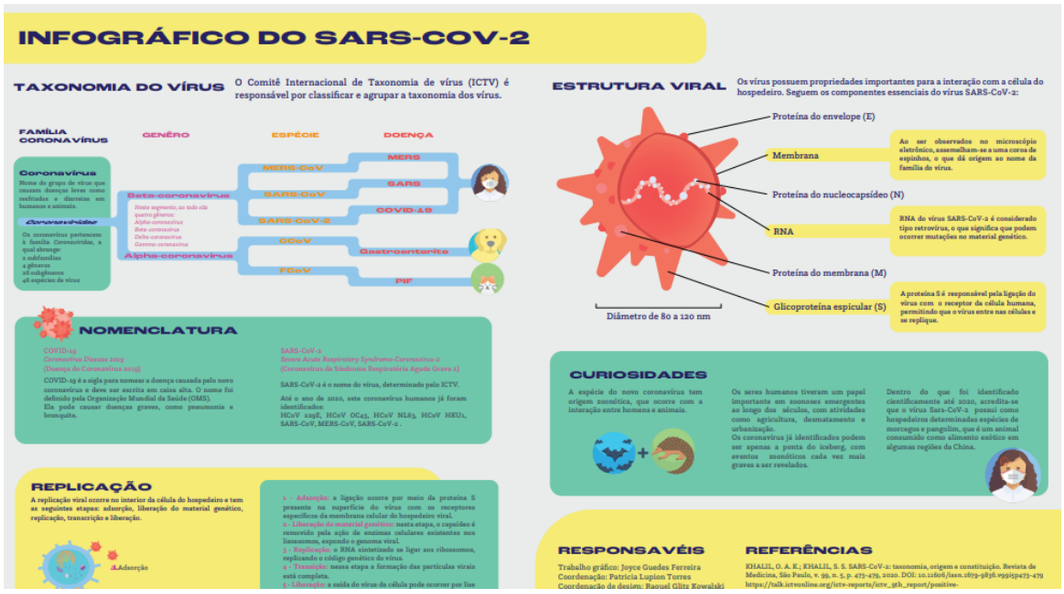
and associated with open educational practices. Figure 3 shows one of the slides of the Open Educational Resource on COVID-19.

Figure 3 - Open Educational Resource on COVID-19

Source: https://connect-eu.exus.co.uk/2021/10/09/juntos-contra-o-covid-19/.

This is another example of an OER that was prepared by the research group to make available to the students of the schools involved. Figure 4 demonstrates an example of an OER on COVID-19 that was prepared to make available to the teachers.

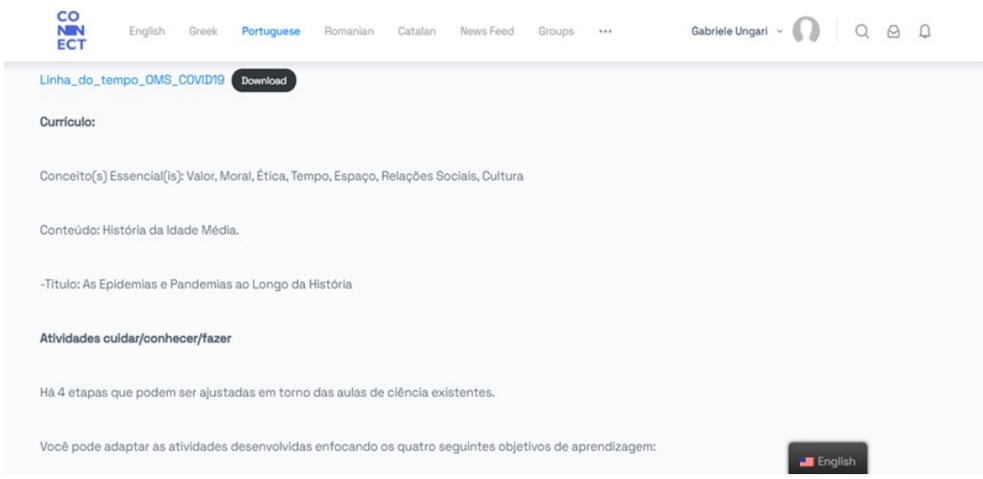
Figure 4 - Open Educational Resource on COVID-19



Source: https://connect-eu.exus.co.uk/2021/10/09/na-linguagem-das-cores-e-formas-a-forca-contra-o-covid-19/.

To continue discussions arising from the implementation of Project CONNECT in schools and to create the open educational resources that were used in the activities developed in the institutions involved in the investigation, the research group met every two weeks using the TEAMS platform during 2020-2021. The researchers of the research group, undergraduate recipients of PIBIC scholarships, and master's and doctoral students in the graduate program in Education (PPGE-PUC) participated in the meetings. The two public school teachers who are developing the project in the schools involved are also students of PPGE and participants in the research group. These two teachers developed OEP that were made available on the CONNECT Platform, as depicted in Figure 5.

Figure 5 - Open Educational Practice on COVID-19.



Source: https://connect-eu.exus.co.uk/2021/10/09/juntos-contra-o-covid-19/

All the activities developed in the group to sustain Project CONNECT were published in a repository in the research group's Google Drive account, and WhatsApp was used to share materials and the meeting schedule and for brief conversations. All the information and orientation needed to develop the activities for Project CONNECT were shared in a collaborative process of co-creation in these virtual spaces.

Final considerations

The challenges are immense but not insurmountable, and here lies the mission of education, which involves supporting schools and universities to open new fronts in the education of teachers and other professionals within an innovative paradigm that requires resignifying and reorganizing the teaching and learning processes.

A complex, transdisciplinary education needs to consider methodological processes that embrace the relationship between theory and practice based on autonomy, the investigative spirit, sharing, and the subjects' commitment to appreciate different cultures and lived experiences in their different dimensions.

The educational methodologies proposed in Project CONNECT incorporate a complex and dialogical view and are meant to produce democratic, emancipating, collaborative, and supportive experiences. Thus, the teachers and students involved are encouraged to look for emerging local and global issues and are invited to follow the methodology proposed in Project CONNECT. Teachers develop OEP that are applied in the classroom using OER. These practices are then shared in a digital environment, the CONNECT platform, to make the material available to other interested students and teachers and to encourage the exchange of the production of scientific knowledge in a network.

Initially, COVID-19 was chosen as the topic to elaborate the OER for the purpose of supporting discussions about topics. According to Moares (2021), it is about providing an opportunity for the self-eco-organization of subjects, teachers, and students to meet intercultural, multidimensional, multi-referential, transformative, and other demands.

The paradigm of complexity (MORIN) and dialogical (FREIRE) view imply the development of people in different places and with different levels of education so that we can believe in the possible dream; seek utopia; mobilize sensitivity; have hope; and promote emotion, creativity, and the willingness to educate for citizenship and social responsibility. Consolidation of this paradigmatic mission requires fighting for spaces that welcome equality of gender, race, religion, among other differences. In this process of change, the mobilization for the planetary consciousness of researchers, scientists, teachers, and students is notable, under penalty of humanity destroying itself and the planet.

Humanity's commitment before the challenges generated by the devastation of people and the planet drives us to offer the population an education that makes a difference for individuals, society, and the planet through a conscious, egalitarian, humane, peaceful, and supportive experience.

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