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Digital citizenship and invention: the ecosystem inhabiting of education for social transformation

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Abstract

The emergence of a pandemic world has tensioned the reinvention of many sectors. In the field of Arts, especially dance, professionals were affected by physical distancing, making shows impossible. As a result, the dancers were stimulated to a process of invention, exploring other sensations and ways of communicating art in a network. This article presents and discusses the co-creation process of a Social Technological Startup, from the ESTEAM perspective and connectively constituted in reticular movements, as an inventive process, from which two inventions emerged: projection mapped performance and dressing wearable technology, both co- created, assembling digital technologies in network, members of a social dance project, teachers and student from different field of knowledge and educational levels. From the cartographic method of intervention-research and based on contemporary theories, the results show that both the mapped projection and the wearables have significant potential to hybridize art and education, contributing to create learning situations that enable a greater understanding of spatiality and the body, as well as inventing new ways of experiencing dance, expanding the sensorial and the digital. The concept of wearables emerged from an inventive ecosystem, which was constituted in the field of education in connection with other areas of knowledge, intending to promote social transformation, through digital citizenship. The relevance of the research stands out, as long as it provided a digital thinking that co-engendered education, a social project, wearable technologies and dance, in the conception of a startup, in an ecosystem arrangement that problematizes the way universities also operate.

KEYWORDS: Digital Citizenship, Social Technological Startup, Wearable Technologies, Art, Education.

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1. Introduction

In recent decades, we have experienced a profound process of world transformation, enhanced by the expansion of computing capacity and digital networks. Digitalization, which transubstantiates the world made up of atoms, into bits, associated with connectivity, has provoked the emergence of hybrid realities, "arch-connected" (Santaella, 2021), allowing us to live and coexist beyond the physical and geographical space. Today we inhabit different spaces and times with our avatars, we immerse ourselves into metaverses, we talk to bots, NPCS (Non Playable Character), intelligent communicative agents and robots. Our senses are amplified by the expanded connection of our bodies, connected to plenty of sensors, such as wearable technologies, provided by the "network of bodies", coined by Matwyshyn (2019) as Internet Of Bodies (IoB). In this perspective, we show that our work, our learning, our creations happen co-engendered with all kinds of digital technology in network.

From a more practical perspective, it makes sense to predict, as studied by Accoto (2020) that IoT devices will turn into IOS (Internet of Senses), that is, a technology that will allow humans to "feel" the world

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through a "sixth digital sense", which complements, enhances and expands the five traditional senses.

The nonhumans, as different contemporary theorists refer, among them Latour and Di Felice, make up with us a transorganic ecological network that constitutes what we call of "world", and challenge us to think of new sensitivitiviness and a "new social". In this new social, many of the concepts we work with, no longer explain the (arch) hyper complexity of these new times/spaces. Di Felice (2017) problematizes both the concept of action and that of socio-technical network (Latour, 2007), since, according to him, we are no longer in an inter-(action) between humans and technical, but in a network, in connection with different entities (human and non-human) and diverse intelligences. Therefore, for Di Felice (2017), the connection and hyper complexity of this network, alter the communicative dimension, which is no longer understood as an informative flow and is understood as a "habitable condition", in an ecological dimension, where different entities do not act any more, but establish with each other a connective dimension, which Di Felice (2017) calls "connective act".

The transorganic perspective, in addition to a new perception of the world we inhabit, it also extends to our body lengthens and hybridizes with the digital. This understanding can be found as early as 1998, when Donna Haraway wrote the Cyborg Manifesto (2017), questioning a body, nowadays constituted not only by atom, but also by bit, and which continuously produces data, of different natures, which result in an immeasurable amount of data. Information. Therefore, we understand that the thinking of our time is constituted with the digital, it is a "thinking with", which requires examining the thought (the conjecture / the conception) when referring to different contexts, such as education, health, entertainment, business.

What happens to Education, based on computational thinking, on code, which is the language of our time, and with the emergence of different digital platforms, which even extend to bodies, such as wearable technologies? The bodies themselves are transubstantiated on platforms, coming into life in different games, when inhabiting characters or even when inhabiting avatars in different metaverses. How Education has been thought in the face of the proliferation of "smart things" that live with us (Internet of Thing - IoT), "connected bodies" (IoB) and, of the metaverses, which have the power to create a "new social sensorium" and new horizons of experiences? Would this not be the new language of Education as well?

With this in mind, it is necessary to question the way in which we are appropriating this language, this "new sensorium", to educate the new generations, so that they can understand, register and undertake, intervening in this world, in the perspective of operating social transformations. In this context, we bring the concept of "digital citizenship", which according to Di Felice (2020), can be understood as the expansion of rights and other participatory forms in a new type of common, connected and interactive between different entities, in order to reshape our idea of the human and of society itself. Since, it is based on a transorganic and unmediated idea of interactions, that is, it does not imply a sender and a receiver (Di Felice, 2020). Also, for Di Felice et al (2018) and Kerckhove et al (2022), educating for digital citizenship means educating for responsible participation, for conscious living and coexistence, in an increasingly connected world. Our task is, therefore, to learn how to build smarter networks, capable of thinking, creating/inventing and disseminating new solutions to social problems. These resolutions can emerge, from the perspective of a citizen education, in place of an education for citizenship, since we understand that citizenship is not something external, but rather, developed in daily living and living, not only linked to geographical spaces, but in a continuity to the virtual digitals that constitute Cibricity today.

Ribeiro (2020) appropriates the term Cibricity and Schlemmer to refer to this hybrid city, which, from a physical, geographic space, made up of atoms, is hybridized with an infinity of digital spaces, therefore, made up of bits. In this hybridization, the different geographic spaces of the city are connected, extended and potentiated in different digital spaces (software, environments, platforms) enabling a co-engendered and atopic inhabiting, thus, involving the individual, biodiversity, technique, information and territory in the constitution of a network ecology (Schlemmer, 2020).

This way of understanding the territory, space and inhabiting led to the emergence of the concept of "econectography". according to Schlemmer and Di Felice (2022) econectography comprises the study of the connective movement between different surfaces, whether geographical or digital, constituting different spatialities, which form an ecology of transorganic connections, between human and non-human entities, constituting others/new spaces, informational, interactional, connective, networked, in flow. As it is distinct, according to Schlemmer and Moreira (2022), it is necessary to understand its virtuality (understood as power) so to transubstantiate the inhabiting of teaching and learning, which requires new epistemologies, new theories that make it possible to invent new methodologies and pedagogical practices.

Our moving about cities or cibricity, in an econectography, have taken place in an onlife perspective, that is, we inhabit this time-space, without the perception of the absence of a border, between being "on" and "off" (Floridi, 2015). And it is for this onlife context that the author understands that "rethinking and developing new forms of education are certainly among the most exciting challenges of our time" (Floridi, 2015, p. 22). The pandemic boosted the

"use of" DT (Digital Technologies) in education and served to demystify them, at a time when teachers became familiar with them, from the perspective of the "use" it becomes relevant to understand how to teach and how to learn in a reality hyper connected. For Floridi (2014), it will still take some time for paradigmatic changes to emerge, making a new type of education and sensitivity necessary for us to realize that the infosphere is a common space.

During the pandemic, in addition to teachers, professionals who make a living from some form of art, were severely affected by the need for physical distance. However, many artists, dancers, also reinvented themselves creating other ways of sensitivity and of communicating their art in a network. With the social project of dance, which is linked to this research, the group started to appropriate digital technologies, to continue to impact their community and take the art of dance, beyond the walls of their homes, creating digital dance spectacle in network. The present research sought to investigate the aforementioned group, in order to problematize new forms of citizenship that developed in connection, in order to co-create a startup with social impact and technological base in a pandemic period. In this context, it presents and discusses the co-creation process of a social technological startup – from the perspective of digital citizenship and education – inventiveness, experimentation, entrepreneurship and social change. This research perspective is based on a new concept of digital citizenship seen as an expansion of rights and other forms of participation in society, whose understanding of social also extends to non-human entities." Understanding it, according to Di Felice (2017), as a "new citizenship", plural, which takes place in a network, connecting, beyond the human, diverse entities in an expansion of rights and participation. Therefore, the creation of a "Social Technological Startup (STS)" emerges as a proposition, from the ESTEAM perspective (Entrepreneurship, Science, Technology, Engineering, Arts and Mathematics), which was constituted in reticular and connective movements, as an inventive process, of where two products emerged: a Mapped Projection spectacle and a wearable technology that we call "Wearable Pulsus". Both co-created agencying digital technologies in a network, members of a social project, professors and student researchers, from different areas of knowledge and levels of education. The motivation, as well as the research context, its processes and results constituted the emergence of OnLIFE Education, connected in the present time, in a perspective of Pandemic Citizenship (Di Felice & Morais, 2021) or "Pandemic Cybercity". In the next section, we present the materials and methods that guided this research.

2. Materials and Methods

The level of complexity and importance of the themes of citizenship and education, in a context of digitality and connectivity, has been studied by the research group, which has been conducting this investigation since 1998. These were the challenges highlighted in the latest research developed by the group, in what refers to social transformation, which promoted the development of the research that gives rise to this article. In the course of these investigations, since 2010, the Cartographic Research-Intervention Method has been appropriated, linked to the concept of invention (Kastrup, 1999), within the scope of reticular and connective epistemologies and of an atopic habitat (Di Felice, 2012), as long as potential for the development of inventive pedagogical methodologies and practices (Schlemmer, 2018), as well as a way to monitor and evaluate learning processes in hybrid and multimodality contexts, from the perspective of an OnLIFE Education (Schlemmer, 2020; Moreira & Schlemmer, 2020; Schlemmer & Moreira, 2020; Schlemmer, Di Felice & Serra, 2020; Oliveira, 2021; Schlemmer, Oliveira, & Menezes, 2021). From this perspective, in the section that follows, we present the cartographic method and the Workshop Design WEinPulsus device, suggested by the research as a inhabiting territory from which problematizations emerge and which it also produces inventive movements, from which there is a condition for the production of new realities.

2.1 Cartographic Research-Intervention Method

This investigation is characterized as qualitative, exploratory and descriptive and uses the Cartographic Research-Intervention Method proposed by Kastrup (2008), Passos, Kastrup & Escóssia (2015) and Passos, Kastrup & Tedesco (2016) as a "hodos-meta" for the production and analysis of research data. Cartography is a method to follow investigation processes, made up of "clues" that guide the cartographer's work, to the detriment of "rules to be applied", as found in more traditional methodologies. In view of this, we understand that in addition to "collecting data" in a "predefined" context, with cartography we "produce data" and reality (research context) in a territory in motion, that is, in a constant process of constitution. That is why the combination of "intervention-research", that is, in the movement of following up the processes, "we produce data with different entities (human and non-human)" and we also constitute a research territory, inventing it, since it did not exist before the research, that is, it was not "pre-defined" in advance. We understand that, from the perspective of this investigation, inventiveness also emerges from the research method.

The choice of the method that, since 2010, has been appropriate by the research group who develops the

investigations, is justified as it responds to the challenges of following a path of production/invention (in the case of this research the co-creation process of a Social Technological Startup, from the ESTEAM perspective) as it occurs, understanding that all research is also intervention. As an intervention, it implies the – cartographer researcher inhabiting the experience that mediates subject and object, theory and practice, in the same production plan; while cartography, it implies the cartographer researcher tracing the plan of experience while he/she follows up the effects of the investigation path on the object, on the researcher him/herself and on the production of knowledge. The method considers the inseparability between knowing and doing, researching and intervening. It is also important to highlight the choice of this method, due to its coherence with the theoretical basis that guides the research, which co-engenders the concept of Invention (Kastrup, 1999), from the Reticular and Connective epistemological perspective (Di Felice, 2012) and an Atopic Dwelling (Di Felice, 2009). We consider that such a theoretical contribution co-engendered to the method is potent for the co-creation of inventive processes and products while developing inventive pedagogical methodologies and practices, as well as a way of accompanying and evaluating learning processes, in hybrid and multimodal contexts, in the perspective of an Education OnLIFE. Next, we present the movements of the cartographer's attention, which configures one of the clues of the method.

One of the clues of the cartographic method, guides the work of "attention of the cartographer", that is, of the researcher, being characterized by four movements: Tracking, Touch, Landing and Attentive Recognition (Kastrup, 2007) and (Kastrup, 2019), as shown in Figure 1.

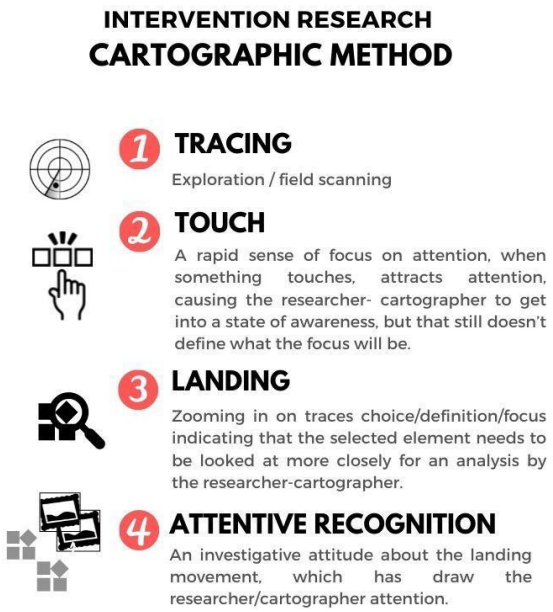

Figure 1 - Four movements of the cartographer (Kastrup, 2007; 2019) - Adapted by the authors.

Tracking is characterized by the exploration/scanning movement of a research field, it is a flight whose attention is open and unfocused (Kastrup, 2007). The Touch movement is the one that is triggered when something in the field of observation calls the researcher's attention, putting him on alert, that is, a quick sensation, something that happens and demands attention. When a specific point is analyzed more closely, a stop in the general perception and an approach (zoom) of a specific element, the cartographer's attention triggers the third movement, called Landing. After noticing that object/individual/ thing that has been detached from the whole, a "magnifying glass" becomes necessary to approximate the details. The fourth movement, called Attentive Recognition, is configured as the activation of a detailed and investigative look at what caught the cartographer's attention and motivated the landing previously. In Attentive Recognition, the space of observation is reconfigured, while the researcher performs the analysis of the data produced and there is the emergence of new knowledge.

It is important to highlight that in the course of the research, these movements may happen in sequence, as described in Figure 1, but they may not complete this cycle either, that is, the researcher may do an exploration (tracing) and not have any element that touches it in that context. However, this attention cycle when materialized, metaphorically assumes the form of an ascending spiral, since with each attentive recognition, new knowledge emerges about a certain research context.

The Cartographic Research-Intervention Method is not just a phase in an investigation process, but permeates the entire process of constituting an existential territory that will be inhabited by a research. Which implies understanding that the "methodology" was not "applied" at a given moment of the investigation when a researcher "observes" a field and "collects data" about it. This is an important point to be highlighted, since this research differs from "traditional" research, in the sense that it was not developed in phases but, in an ecosystemic, connective and reticular perspective, connecting different entities (human and non-human). human) and their networks, as they emerged in the course of the investigation and constituted the existential territory of the research. In this sense, for the authors De Barros and Kastrup:

> *"Unlike the method of modern science, cartography does not aim to isolate the object from its historical articulations nor from its connections with the world. On the contrary, the objective of cartography is precisely to draw the network of forces to which the object or phenomenon in question is connected, accounting for its modulations and its permanent movement" (De Barros & Kastrup, 2015, p. 57).*

The research work with cartography is done through the engagement of the one who knows, in the world to be known, that is, when researched and researcher are in an existential territory, cultivated by investigation (Alvarez & Passos, 2015). In this research, the existential territory will be constituted as the immersive WEinPulsus Design workshop, described in the next section.

2.2 WEinPulsus project Workshop - Wearable and Education in Pulsus

In 2020, the social dance project was invited by the authors of this article to participate in an Entrepreneurship Hackathon, in order to start a movement to think about a STS. It has the purpose to enhance the performances of the aforementioned dance group, since they were reinventing themselves in the online context, due to the coronavirus pandemic that prevented them from performing shows with physical presence. This participation made us realize that the concept of "social technology" is reinventing in the online context. This participation made us realize that the concept of "social technology" that we were constituting was still far from a product, a "startup" or a pre-incubation/incubation process outlined by that event. And, although away from our theoretical and epistemological conceptions intended for the conceptualization of a "social technological startup". Our participation in this event, as a proposed intervention in the research movement, was of singular importance, considering that it stressed us in two ways:

a) to problematize this model of constituting a business. We understand that a possible future incubation could happen in a network, not requiring a physical space, geographically located, which would imply payment of fees, for its occupation; b) why a problem emerges from this event, that is, we invent a problem – we conceived a wearable technology. However, to become reality, as an invention, it would need to be "cultivated". For Luiz Orlandi, so that a problem could emerge as an invention, it is necessary to "create lines of solution and constitution of devices that enhance its emergence" (Kastrup, 1999, p. 11) In this sense, in the context of this research, the Project WEinPulsus workndersto od as a connective and collective research territoshop was proposed, as a place where the problem was fostered. The WEinPulsus Design Workshop is ury, which was invented in the course of the research, permeated by the movement of problematizations that were emerging, by the interventions that were being provoked by the different entities (human and non-human) that agency the process and the cartographic attention of the researcher (Kastrup, 2007; 2019). It is characterized as a "space-time-code" that, over 10 immersive encounters, was constituting a territory of investigation, from which an inventive, ecosystemic and reticular process emerged, articulating undergraduate and graduate students, a social dance project, research professors and; as non-human entities, digital network technologies such as WhatsApp, Microsoft Teams, Evernote, Google Jamboard, Miro, Tinkercad, Arduino prototyping board, sensors, fabrics (textiles and biomaterials), images, dance, choreographies, photographs, that is, those entities that left traces (digital or physical), as highlighted in Figures 2 and 3.

The meetings took place mostly completely online, since we were in a period of physical isolation, caused by the coronavirus pandemic, inhabiting the Microsoft Teams platform. However, we managed to hold two meetings in the physical space of the University, in the hybrid perspective, that is, some subjects were physically present at the place while others were online and some spaces were transubstantiated to digital. We understand that WEinPulsus, in addition to being an action-only device (human intervention), were meetings and connection, which articulated: a) students and teachers of different educational levels (Basic Education, Higher Education and stricto sensu) from different fields of knowledge (Education, Physical Education, Arts, Design, Electrical Engineering, Computing, Management); b) a social dance project (where two members who participate in the project as dancers and choreographers, (undergraduate students in Physical Education); c) imbricated with three research projects (Education and Design).

We understand that both the inventive process and the products that emerged from it, such as the Pulsus wearable technology and the Mapped Projection, are inventions, co-creations that are implied by theoretical concepts and by an "inventive policy" (Kastrup, 2008; 2019). These can be appropriated, expanded, reinvented in other educational processes and instigate the invention of new pedagogical practices, expansion of learning spaces to digital, rethinking formative processes and appropriating other wearable technologies (off-the-shelf products/technologies). In the context of this existential territory, entities of different natures, materiality or transubstantiality are acting in the inventive process, in the research movement. And it is constituted in several ways, as a collective and connective space of intervention, expression, sharing of experiences, co-creation, co-engendering and consequently of invention and, from which emerges the concept of "Social Technological Startup'' in ESTEAM perspective, which involves a projection-mapped spectacle and wearable technology, described in the results section.

3. Results

With regard to digital citizenship and inventiveness, in this investigation we presented as results, the emergence of a "Social Technological Startup" in the ESTEAM perspective, consisting of two products

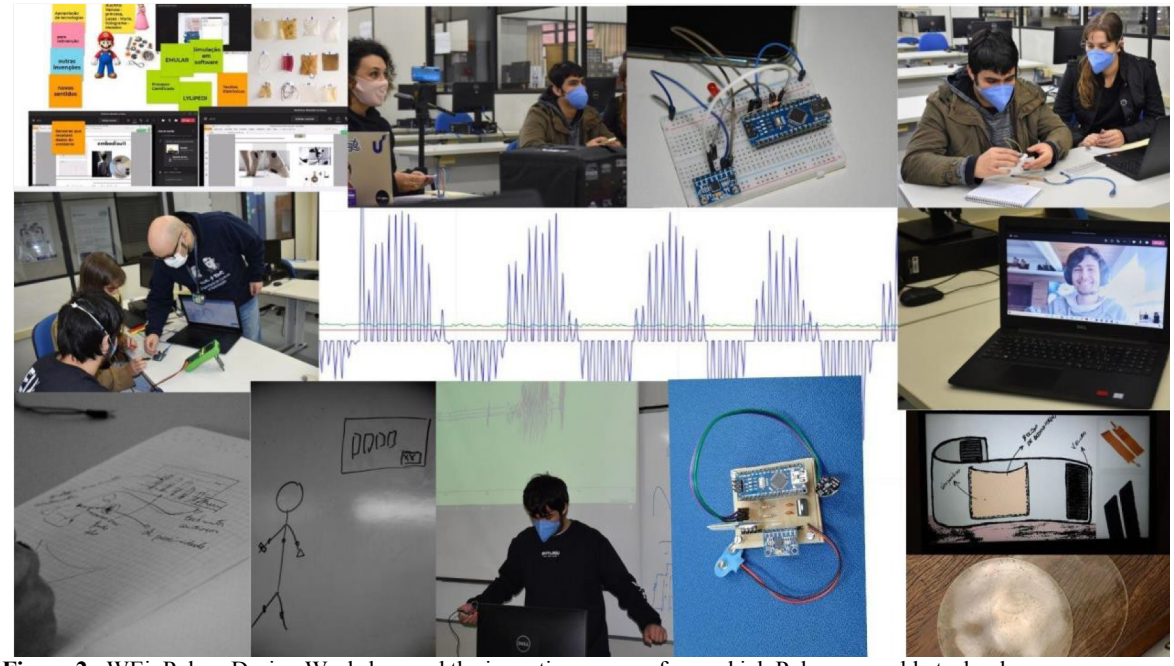

Figure 2 - WEinPulsus Design Workshop and the inventive process from which Pulsus wearable technology emerges.
Source: research archive.

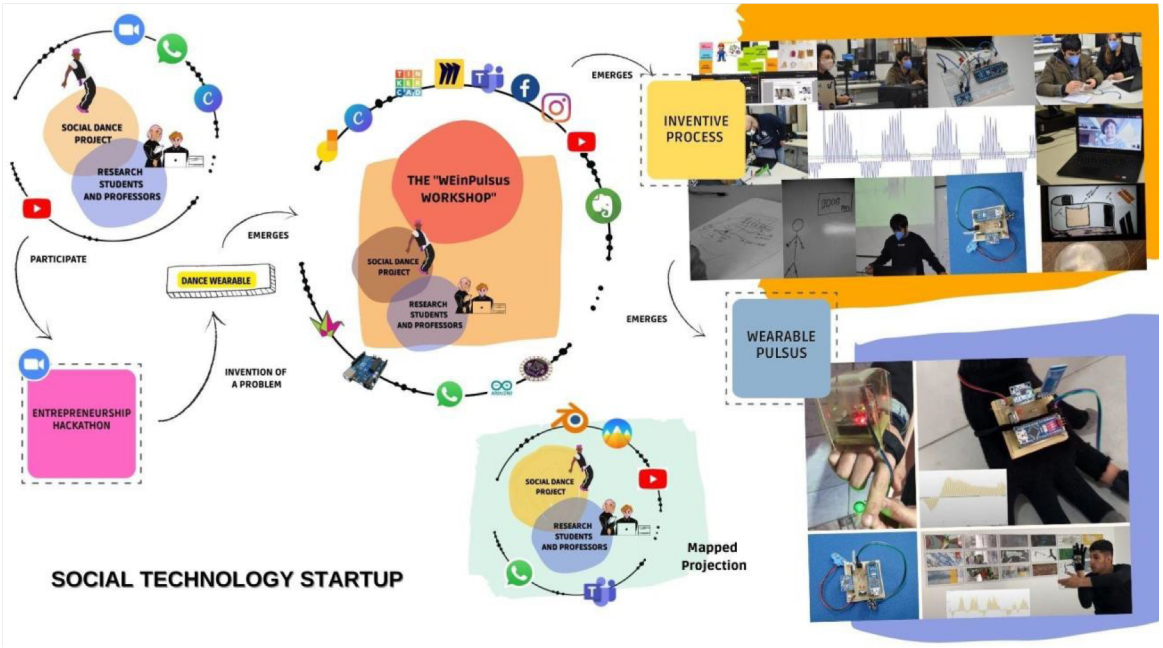

Figure 3 - Context of the "Social Technological Startup".
Source: research archive.

(inventions), in the context of dance: a Mapped Projection spectacle and a wearable technology, both in the sense of expanding the actions already developed by the social dance project and enhancing the possibilities of spectacle developed by it, in a pandemic period and beyond.

In Figure 3, we present the context of the emergence of the Social Technological Startup and in it we detail aspects of inventions as the entities involved and the inventive process of their constitution. The mapped projection spectacle was the result of a co-creation process, which originated with a training carried out by the research group that conducts this investigation with the members of the social dance project, so that they could appropriate Blender technology, which enables the modeling of 3D scenarios. The qualification of the involved students from the final grades of Elementary School at a municipal public school, located in a socially vulnerable zone, which members of the

Figure 4 - Presentation of the Dance Social Project with Mapped Projection co-created by them in coupling between digital technologies and bodies.
Source: research archives.

aforementioned social dance project are also studying. Throughout the training, participants learned different 3D modeling and animation techniques, developing the skills needed to create mapped projections. This knowledge resulted in the composition of the spectacle, as shown in Figure 4.

With regard to Pulsus wearable technology, the concept of a STS emerged, in the research-intervention movement, when the collective participated in an "Entrepreneurship Hackathon" (in November 2020) and their immersion in the WEinPulsus Project Workshop (March to August 2021). In Figures 5 and 6, we present the Pulsus wearable technology (in prototype), configured as a glove, whose functionality is to capture the dancer's movements, in relation to the axes (X,Y,Z) when he performs a choreography. In coupling as an agency of the dancer's body, choreography and Pulsus wearable technology, together, an entity human and non-human, produces an aesthetic expression.

These products and the inventive process involved in this research constitute the movement of collective research and connectively articulating dancers of a social project, research professors, different digital technologies in a network in order to expand its social reach and who knows, in the future, establish- if economically, in digital, providing the public with another sensitivity, in coupling of different connected intelligences.

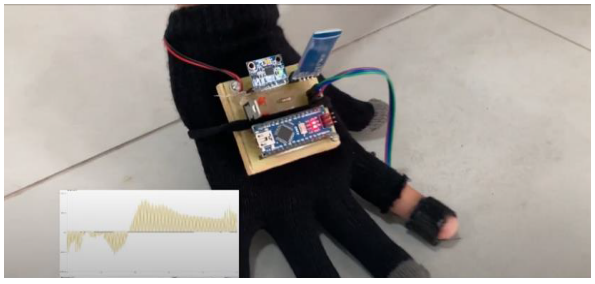

Figure 5 - Wearable Pulsus (prototype).
Source: research archive.

4. Discussion and Conclusions

Regarding to digital citizenship and inventiveness, in this article we present and discuss the conception of a STS, from the ESTEAM perspective, which culminated in a spectacle of mapped projection and the prototyping of Pulsus wearable technology. Both were co-created by managing digital Technologies in network, members of the social dance project, students and teachers from different levels of education and areas of knowledge, as well as researchers from different postgraduate programs. In this sense, we understand that we have developed an inventive process, supported by contemporary theoretical-epistemological and methodological conceptions that problematize digitality and connectivity in education, from the perspective of OnLIFE Citizen Education (Schlemmer,

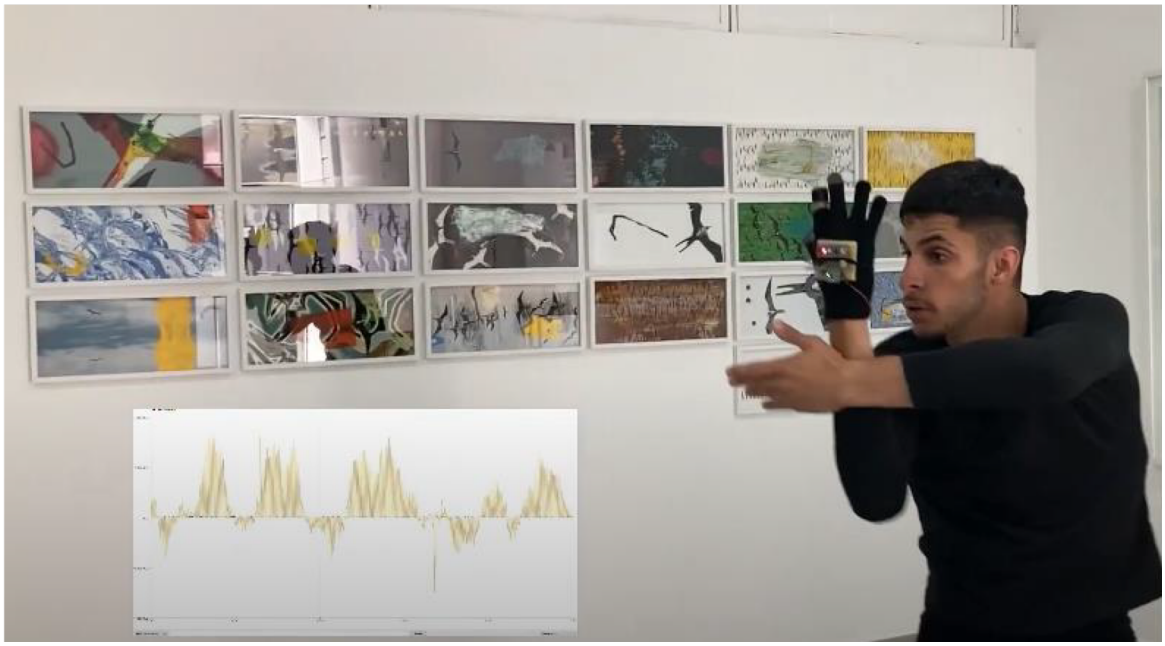

Figure 6 - Choreography, Wearable Pulsus and an Aesthetic Expression produced by the "coupling as agency" between dancer (body/dance) and wearable.
Source: research archive.

2020). This, understands digital citizenship as something that is lived and experienced in the reticularity, through the continuous connectivity between humans and non-humans, in a world more and more hyperconnected. Therefore, it is not an education "for" digital citizenship as if it were something external to us, since it is no longer understood as something external and starts to be developed in living and coexisting in different spaces and times.

The path that we constituted in this research involved what Di Felice and Morais (2021) called "pandemic citizenship", since we were forced to inhabit an infected world. We were forced to "inhabit informative geographies and experience distant proximities" Di Felice and Morais (2021, p. 275). And, in this sense, we reinvent ourselves in the face of this new complexity that was presented to us by the cruel pedagogy of the virus. For the research group that conducts this research, this pandemic scenario presented a territory of investigation and encouraging inhabit to the studies that had already been developed since 1998, about digital technologies and education in a social and citizen perspective. For the social project of dance, the pandemic presented limitations, but that awakened in them other perspectives of acting through the digital network.

Regarding the mapped projection and the Pulsus wearable technology, we understand that both constitute an interactive attraction to the spectacle, which provides a differential for the choreography and costumes of the social project of dance. In their constitution process, they intended to empower the dancers themselves and the community, in the sense that they could appropriate digital technologies and co-create them, in partnership with other entities (human and non-human), developing autonomy and authorship, as well as sustainability and innovation to the process of creating their spectacle.

With regard to the results of this investigation, compared to other studies, we can underline, in an analysis perspective, implications about the methodology that we conducted this study, digital technologies, the inventive process from which products emerge and the inventions themselves: the spectacle of mapped projection and the Pulsus wearable. We understand that in this research, unlike other investigations that follow more traditional methodological approaches, with pre-defined procedures and processes, we co-created a disruptive, ecosystemic and transdisciplinary movement, based on the appropriation of the cartographic method of research-intervention, which allows us to think and conduct a study. It demanded the meeting between researched and researchers, who together co-created an existential territory, where research can be cultivated. Tensioning the traditional representation or processing of information about a supposedly "pre-defined world", when at each meeting we invented the existential territory of the WEinPulsus workshop, in the movement of problematizations that were arising and we were co- creating an inventive process and a wearable technology. We also understand that the WEinPulsus workshop emerges from this investigation as an "inventive pedagogical practice", as an alternative to the current practices prevailing in teaching and learning processes in an online context.

In relation to digital technologies, from a pedagogical point of view, we understand them as partners in the learning process. In our research, they are understood as distinct intelligences, coengendered with humans, as environmental forces. To the detriment of research that uses them as mere "tools", in an exclusively "use" perspective. In this sense, we can still problematize, in relation to other researches, the field of wearable technologies, which make use of ready and closed wearables (of the shelf type) such as glasses, watches, industrialized clothes or action cameras.

In this investigation, we present a study about the cocreation of wearable technology, from the perspective of invention. Therefore, we understand that we have ascended other researches, which investigate from the perspective of "use of", to the context of "appropriation" and invention. We understand the appropriation of wearable technologies as supporting and potentiating inventive processes, when we incorporate them into inventive learning processes. However, in this research we understand that we moved forward in relation to other studies in the sense of the invention.

This perspective can be followed in the inventive path, pointed out in Figures 2 and 3, from which Pulsus wearable technology emerged. In this way, wearable technology is co-created, in the context of electronic fabrics (e-textiles) involving design and conception (process), from an inter/multi and transdisciplinary perspective rather than the "use of" ready-made wearable technologies. Regarding the limitations of the research, we highlight that: The emergence of the STS happened even in the face of a pandemic period that it affected many contexts significantly worldwide. For our research, it presented aspects that could have limited it, since we were prevented from physically meeting in the same geographic space, whether the University, the laboratories, the city or the headquarters of the social dance project. However, we understand that digital technologies and communication networks have potentiated and expanded the possibility of articulating ourselves in a network, and the configuration that the meetings were assuming allowed all to experience an inventive, immersive, connective and mobilized work format. by the problematizations that were emerging in the research movement.

The meetings, in turn, took place without cost, without physical translation, without needing a physical space to co-create and, sometimes, not even physical materials, considering that they were transubstantiated to Classcraft, Microsoft Teams, Youtube and Whatsapp, by the which the training process for the co-creation of the mapped projections was developed and; more specifically in the context of the co-creation of wearables, Tinkercad, which is an online technology that simulates analog and digital electrical circuits (Autodesk, 2021), in addition to other technologies that were engendering during the course. As we were in physical isolation and without work or academic activities, there was time available to engage in the activities we developed, both related to training in mapped projection and the WEinPulsus workshop. During this period, it was possible to make several connections with students and research professors from different areas of knowledge, in the sense of mentoring our inventive process, in order to provide knowledge that was necessary, in the movement of problematizations and research.

It is important to mention that Pulsus wearable technology is in the prototyping phase, but we hope that soon, the social dance project will be able to appropriate this social technology in order to bring creative, economic, social and environmental benefits to its community. However, from the perspective of inventiveness, we understand that these limitations inaugurate new problems, that is, they create space and problematizations for a new inventive process and the potential for innovative solutions to problems, thought collectively and connectively, in a network.

As the research group has already been carrying out investigations towards a Connective Innovation Ecosystem in Education; Schlemmer, Morgado & Moreira (2020), we believe that we have a favorable territory for the emergence of a STS that depends on the articulation of several areas, knowledge such as technology, management, law, economics, design. In this sense, we continue in a constant process of articulation to expand the potential for creating new products. It is important to highlight that the characteristics of a wearable technology also imply interdisciplinary and transversal areas, to the knowledge provided by an educational institution, such as strategic design, physical education, computing, electrical engineering, art, social entrepreneurship, which need to be mobilized and articulated with other fields of knowledge beyond the University.

It is important to mention that in addition to the perspective of the University's habitat related to a campus, being physical, geographically located, or even digital, made possible by traditional technologies such as VLEs and, more recently, by platforms such as Microsoft Teams, Meet, Zoom, the possibilities of the Metaverses, the Internet Everything (IoE) or the Internet of Senses, which enhanced lifelong learning, in different times and spaces. It also provided the constitution of transorganic networks that favored the overlapping between spaces -formal and non-formal times of education, helping to minimize the dichotomy that previously existed between the place destined for knowledge (socially recognized institutions for this purpose, therefore, educational institutions) and places for its "application" (the world of work). This requires from educational institutions, especially Universities, a process of reinvention, so that they can maintain their social relevance in a hyperconnected world.

The inventive process that gave rise to STS, from the ESTEAM perspective, emerged in transorganic connective acts (between different human and non-human entities). These connective acts, as an act and, therefore, unrepeatable, were forming in a particular way with the collective that was built. Thus, it is not a methodology or technique to be applied, but a process to be developed. Inspired by the Cartographic Research-Intervention Method, we understand that the process developed can provide clues that can guide other inventive paths. It is important to mention that due to the pandemic, it was possible to experience the process of cocreation of a STS, from the ESTEAM perspective, in a network, which was becoming an atopic habitat. It should be point out that, initially, the proposal was to incubate it in a technology park, with a defined physical location, which would imply different costs related to physical infrastructure, translations, among others. With the pandemic, in addition to the challenges, possibilities emerged, opportunities that also instigated the invention in the sense of thinking a STS-ESTEAM in a reticular and connective architecture, which develops in an ecology of transorganic connections, constituting other/new spaces.

We understand that the results originated from the research expand the knowledge in the area as we invent a wearable technology, from the perspective of co-creation, which presents the concept of "coupling as agency", where the dancer creates the technology and the technology transubstantiates the dancer's movements in an implied aesthetic expression of art, sensors and where creator and creature are co-engendered. A technology that allows for a "new sensorium" or "a new sensory apparatus" (Accoto, 2020), expanding our ability to perceive the world and straining a look at our body as a network.

The results, in addition to problematizing, expand the understanding of startup, which in the research is coengendered with the concept of social technology in a STS-ESTEAM perspective and is structured and developed in a connective network, without the need for a physical space, geographically located to exist. The network also expands and connects, according to the demands of its movements, some geographic spaces, such as: the place of production of choreography, costumes, laboratory at the university, residence of dancers, teachers, researchers, venue of the show, among others that may be necessary to achieve your goals.

The conception of a STS in the ESTEAM perspective, not only creates an ecosystem for connection, experimentation and inventiveness on the part of the entities that constitute it, but also establishes a favorable territory for the development of entrepreneurship in the social and citizen perspective, from the empowerment and for the collective and connective construction of knowledge.

In this article we presented and discussed the co-creation process of a STS, from the ESTEAM perspective articulated to the concept of digital citizenship and inventiveness. In the research, stressing the very concept of citizenship, as the potency that emerges from it, through the digital network. We understand that when producing investigations from the perspective of digital citizenship, we problematize our actions, now connected to different entities and we can create learning situations that can educate for responsible participation where there is space for collective and inventive thinking, which allows us, in a network and partnership with other intelligences to create innovative solutions to social problems.

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