

Investigating a *Tecnologia Social* from the Perspective of Actor- Network Theory and After

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Abstract

The aim of this research is to identify and analyze the local socio-technical readjustments and the heterogeneous network involved in bringing a *technology for the social* closer to a *tecnologia social (TS) as a social construct*. Technologies as a social foundation, represented by *tecnologias sociais*, show a way to create, develop and implement technology aimed at solving social problems. In Latin America, especially in Brazil, two visions are used to characterize *tecnologia social*: (i) *TS as a social construct*, in which the technology is built and/or readapted through socio-technical adjustments with the participation of the local community, and (ii) *technology for the social*, in which the technology is transferred via programs, artifacts, or methodologies that improve the lives of the assisted community. We studied a *replication* of an entrepreneurial education program for vulnerable young people, which is considered a *technology for the social* because the program has its own methodology and was not developed with the participation of the community involved. We adopted the theoretical-methodological basis of Actor-Network Theory (ANT), in its version Actor Network Theory and After (ANT and After), based on three elements: enactment, hinterland and political ontology. Our results show how a *technology for the social* for entrepreneurial education can be brought closer to a *TS as a social construct*, allowing us

to elaborate two points of discussion. These points constitute a contribution both to theory, thinking about future research agendas, and to the practice of *technology for the social* programs, offering opportunities for socio-technical adaptations that take into account local knowledge, thus promoting social transformation. In addition, another theoretical contribution is to illustrate the use of ANT and After concepts for TS studies, meeting the need to avoid using ANT in a simplistic way, as a mere tool to study an artifact.

Keywords: *tecnologia social*; actor-network theory; entrepreneurial education.

Introduction

Tecnologias sociais (TSs) can be seen as a way of creating, developing, implementing and managing a technology aimed at solving social and environmental problems, generating dynamics of social inclusion and sustainable development (ITS Brasil, 2018; Thomas, 2009). Duque and Valadão (2017) point out that, in the Brazilian context, there are two conceptual approaches to *tecnologia social*: i) *TS as a social construct*, in which TS is developed and implemented through interaction with local communities, with the aim of meeting the demands and interests of these communities and promoting social transformation (Valadão, Andrade, & Alcântara, 2019; Dagnino, Brandão, & Novaes, 2010); and ii) *technology for the social*, in which TSs can be seen as articulations, programs, and artifacts that, when introduced into the social environment, can improve the life of society. Although different, both can be transferred to other contexts. The transfer of a *tecnologia social* – to contexts other than those initially conceived – does not occur in a mechanical and linear way, but requires careful adaptation and appropriation by potential users (Fonseca, 2009; Pozzebon, Christopoulos & Lavoie, 2019). These socio-technical adaptations can be seen as one of the pillars of *TS as a social construct*. The transfer of a *technology for the social* usually has a mechanical and instrumental character, focused on predefined solutions, more applicable in homogeneous contexts, such as mass vaccination programs, and dependent on factors such as institutional commitment and the ability to adapt to local demands (Van Oudenhoven & Wazir, 1998; Weber, Kroeger, & Lambrich, 2012). However, with each transfer and its successive interactions, this technology is in a constant state of flux and differs significantly from what was originally conceived, which could be a starting point for a *TS as a social construct*.

In this research, we studied a *technology for the social* for entrepreneurial education, consisting of an entrepreneurial education program focused on vulnerable young people. This characterization of TS is consistent with a *technology for the social*, since the program was not developed with the participation of the target community and was initially *replicated* in different regions of the country. The entrepreneurial education program studied uses a methodology that aims to help vulnerable young people increase their income and perhaps alleviate poverty in peripheral communities. The program uses a methodology developed by a social development agency that provides guidelines for low-cost entrepreneurial education. The training establishes a simplified ten-step process to help vulnerable students design their own businesses, providing guidance on products, sales, marketing, costs, finances, branding and the market. However, little is known about how this program is transferred in different locations. Depending on interactions with the local community, socio-technical adaptations could occur that bring a *technology for the social* for entrepreneurial education closer to a *TS as a social construct*. The aim of this research is

to identify and analyze local socio-technical adaptations and the heterogeneous network involved in bringing a *technology for the social* closer to a *TS as a social construct*.

To this end, we adopted Actor-Network Theory as our theoretical and methodological basis, specifically its version Actor-Network Theory and After. ANT, in its initial, classical phase, expands the understanding of “actors” to include human and non-human elements, all of which are considered actors (Law, 2002). The term “actor” refers to any entity, human or non-human, that plays an active role in a network of relationships (Latour, 2000). Furthermore, it focuses mainly on “following the actors” in the dynamics of translation and formation of networks (Callon, 1984). The “After” phase introduces a more critical reflection, recognizing that networks are more unstable, fragile, and entangled in political and power contexts that arise from the associations of heterogeneous elements (Law and Mol, 2001; Law & Mol, 2008). This makes the theory more flexible and useful for a wider range of complex social analyses (Law, 2004; Law & Singleton, 2005). From this recognition comes the development of important elements in ANT and After, such as enactment, hinterlands, and political ontology, mainly from the work of Bruno Latour, Annemarie Mol, and John Law, which are central to the analysis of this research. The analysis and discussion made possible by the use of ANT and After are open and dynamic, and their theoretical-methodological foundations are suitable for the study of a mobile object (Blok, Farías, & Roberts, 2020), such as a *TS*. Thus, one of the theoretical contributions of this research is to illustrate the use of concepts of ANT and After in *TS* studies, meeting the requirement of not using ANT in a simplistic way, as a mere tool to study an artifact, a black box or an obligatory passage point (Lorenzi et al., 2021). ANT and After makes it possible to elucidate the mechanisms and practices that emerge in the study of a *tecnologia social*, making it possible to identify and monitor the socio-technical associations that occur during this process (Valadão, Andrade, & Neto, 2014). In this way, the study contributes to the study of science, technology and society in Latin America (Marques, Costa, & Holmes, 2014) by signaling that the relevance of concepts, theories, and technologies cannot be understood without linking them to contingent realities and a heterogeneous network of actors. In addition, the study analyzes the relevance and agency of non-human elements in the study of the social. It should be noted that in most research using ANT, the actions of non-humans are relegated to a secondary role and often subordinated solely to human interpretation (Tureta & Alcadipani, 2009).

The results, through the lens of the concept of enactment, emphasize the idea that realities are neither predetermined nor fixed, but emerge from the practices and actions of the actors involved, and point to the actors who influenced the success and failure of a *TS*. Hinterlands made it possible to identify a kind of invisible or hidden condition – a set of technological structures that made actions and practices possible and/or unfeasible. Finally, political ontology made it possible to identify two constructs of power: what constitutes “entrepreneurship” and the economic interests of the agency and sponsors running the program. By “following the actors” (Latour, 2005), our results provide clues as to how a *technology for the social* for entrepreneurial education can be brought closer to a *TS as a social construct*, allowing us to draw points of discussion for this convergence. These points constitute a contribution both to theory, thinking about future research agendas, and to the practice of *technology for the social* programs, offering opportunities for socio-technical adaptations that take into account local knowledge and promote social transformation.

In the next section, we deal with the concepts of *technology for the social* and *TS as a social construct*, and then bring in the section on entrepreneurial education technology, delimiting the object of this investigation. ANT and After and the concepts of enactment, hinterland and political ontology are presented immediately before the methodological path. The article ends with a presentation of the results, discussion and concluding remarks.

Technology for the social and TS as a social construct

Extensive debates in the field of technology have shown that conventional technologies consume large amounts of resources and make intensive use of natural, human, and financial capital, often contributing to the exclusion of workers and citizens in sectors such as manufacturing and agriculture (Pozzebon, 2015). The transfer and *replication* of these technologies from developed countries to developing countries has often failed to achieve social inclusion and poverty reduction. *Tecnologia social* (TS) was developed as an alternative to the often foolish and inefficient application of conventional technology (CT) from Western countries in developing country contexts (Dagnino, 2010). In contemporary discussions, a socio-technical approach to *tecnologia social* has been discussed and analyzed in order to better understand and provide an effective alternative to the dominant technological standards (Valadão, Andrade, & Neto, 2014). TS refers to a set of techniques and methodologies developed and/or applied in interaction with and appropriated by the population, culminating in solutions for social inclusion and improved living conditions (ITS Brasil, 2018). *Tecnologia social* also refers to a way of creating, developing, implementing and managing a technology aimed at solving social and environmental problems, bringing about social and economic dynamics of social inclusion and sustainable development (Thomas, 2009). Some principles are characteristic of *tecnologia social*, such as social transformation, participatory development, local contextualization, simplicity, low cost, *reapplicability*, and the viability of grass roots enterprises (Silva, 2012).

Through a bibliometric study, Duque and Valadão (2017) point to the predominance of two main visions of *tecnologia social* used nationally: i) *TS as a social construct*, whose main author is Renato Dagnino, which can be *reapplied* through socio-technical adaptation; ii) *TS as technology for the social*, consisting of articulations, programs, artifacts or methodologies that improve the life of society once they have already been introduced into the social environment. Silvio Caccia Bava is the main theoretical proponent of this view. In studies where TS is referred to as *technology for the social*, Duque and Valadão (2017) highlight the attempt to apply scientific knowledge to bring about social transformations through the generation of low-cost technologies that are appropriate or alternative to local contexts. The challenge of this approach to TS is not to fall into the trap of using a technology in a utilitarian way to produce scientific knowledge without giving voice to local specificities and knowledge, as opposed to the *reapplication* of a TS as a social construct that is adapted and reinvented in each new context in which it is used, favoring the active participation of people and the construction of knowledge based on local references (Fonseca, 2009). This is not a simple transfer of a technological solution between municipalities, but rather an adaptation to the specificities of each reality, creating a dynamic process that generates new knowledge based on the daily experiences of those who apply it (Pena, 2009; Weiss, 2009). *Technology for the social*, which is the subject of this research, adopts a linear and instrumental approach, focusing on predefined solutions that can be applied in homogeneous

contexts. It is characterized as an entrepreneurial education program. In the next section, we look at the conceptual basis of *TS* for entrepreneurial education.

***Tecnologia social* for entrepreneurial education**

Entrepreneurship has a significant impact on society, creating jobs and boosting local economies (Lee, Florida, & Acs, 2004; Shane & Venkataraman, 2000). Many countries, through their political and governmental institutions, have sought to promote and improve public entrepreneurship policies in order to stimulate the economy and alleviate poverty (Lüthje & Franke, 2003; Vansandt & Sud, 2016). In this context, especially for developing countries, *tecnologias sociais* for entrepreneurial education can be seen as a relevant way to promote the emergence of small businesses, micro-enterprises or own businesses, which can create or increase income, alleviate local poverty and perhaps enable social inclusion.

Entrepreneurial education consists, above all, of developing students' skills in a way that allows them to combine theory with entrepreneurial practice (Sánchez, 2013; SEBRAE, 2016a). Didactic content generally emphasizes the personal characteristics of the entrepreneur and aspects of entrepreneurship, such as the problems commonly faced and the basic requirements for starting and developing a business (Liñán, Rodríguez-Cohard, & Ruenda-Cantuche, 2011). However, entrepreneurial education, especially for vulnerable young people, requires an understanding of the different temporalities, scales and solidarities that help to overcome the lack of resources (Scalco & Machado, 2017). For entrepreneurial education to be successful with young people from vulnerable communities, it is particularly necessary to understand these young people's visions of their life projects, their (im)possibilities of action, the forging of their identities and the (re)construction of meanings of their "being in the world," taking into account their potential for transformative action in their immediate contexts, in order to empower them in the face of the adverse situations to which they are exposed (Trajber, 2010).

Despite historical and social peculiarities, in Brazil, as in other Latin American countries, there is a strong commitment to the economic and sustainable development of rural and metropolitan areas through *tecnologias sociais* for entrepreneurial education. In rural areas, for example, there is an emphasis on sustainable education in agriculture with *tecnologias sociais* such as PA (Pedagogy of Alternation), which offers technical and practical training aimed at learning agriculture, providing opportunities for professional insertion and entrepreneurial action, focused on the family economy, acting as an agent of transformation in the socio-professional environment (Fonseca, 2008; Valadão, 2014). Also noteworthy is the work of ADEL, the Local Economic Development Agency, originally from Northeastern Brazil, which uses PA as a teaching method for its Entrepreneurship and Management Training course. This agency runs a four-month course in which participants spend a week in the training center, in classes and group work. The young people who participate in this course learn concepts and tools for planning, creating, managing and developing rural businesses, analyzing the contexts in which they want to operate, identifying opportunities, and preparing business plans and projects. ADEL also provides access to targeted credit for young entrepreneurs, as well as the opportunity to join a network of young rural entrepreneurs and Integrated Technology and Information Centers (CITs).

The *tecnologia social* for entrepreneurial education can be developed through work projects that encourage the formulation and solution of problems, social interaction and creativity, bringing the school (or educational program) closer to everyday life and considering student as agents of their learning process. The aim is to awaken entrepreneurial values as a way of promoting social development and encouraging active participation in the construction of society (Dolabela, 2008). *Tecnologias sociais* for entrepreneurial education use concepts similar to those outlined in Dolabela's Entrepreneurial Dream Theory and Entrepreneurial Pedagogy (2003, 2008). Entrepreneurial Dream Theory encourages and prepares students to dream and to try to make that dream come true. To this end, the teacher takes on the role of creating a favorable environment for entrepreneurial development, being a promoter of entrepreneurial culture and enabling students to develop their own entrepreneurial life project (Dolabela, 2011). Entrepreneurial Pedagogy, on the other hand, promotes human and social development, encourages sustainability and considers entrepreneurship as a way of being and not just a way of doing. The focus is on preparing students to actively participate in social construction and development, with the aim of improving the life of the community and eliminating social exclusion.

The entrepreneurial education program studied is designed to promote the businesses of young people from disadvantaged communities. This program is characterized as a *technology for the social* because it was not developed with the participation of the target community using a proprietary methodology developed by a social development agency. In order to identify clues as to how a *technology for the social* for entrepreneurship education could be brought closer to a *TS as a social construct*, we used a theoretical-methodological approach based on Actor-Network Theory (ANT). ANT provides a comprehensive and detailed view of the interactions among the multiple actors involved in a *TS*, capturing both the human and non-human aspects that influence the development and adaptation of the *TS*. It makes it possible to understand the dynamic and complex networks that underpin the *TS*, and is a particularly appropriate approach for studying how these *tecnologias sociais* are shaped and transformed in different contexts (Valadão, Andrade, & Neto, 2014).

Actor-Network Theory: reflections on the concepts of enactment, hinterland and political ontology in a *tecnologia social*

Actor-Network Theory derives from schools of thought in the history, philosophy, and sociology of science and emerged in the 1980s through the work of Michel Callon and Bruno Latour (Law, 2004). In this classical phase, elementary concepts of the theory were published, such as translation, controversies, black boxes, obligatory passage point, among others. After receiving various criticisms (Walsham, 1997; Watson, 2007) and leading to heated debates, ANT was transformed over time, improving concepts and possibilities for exploring the "social" (Blok, Farias, & Roberts, 2020). Later, at the end of the 1990s and in the first decade of the 2000s, a second phase of ANT developed, called Actor Network Theory and After, in which the original concepts were extensively discussed and new concepts, debates, and improvements were produced (Latour, 1999, 2005; Law, 2004; Law & Mol, 2008). This second phase is not antagonistic to the first phase; on the contrary, it complements, develops, expands and reinforces concepts identified

in the first phase. Next, we discuss three concepts that allow us to analyze and expand the understanding of a *TS* for entrepreneurial education: enactment, hinterland and political ontology.

ANT asserts a symmetrical view of humans and non-humans in its analysis of the associations that constitute reality (Latour & Woolgar, 1997; Law, 2003). Thus, the capacity of heterogeneous elements to act and perform is referred to as enactment. The focus of ANT is to describe the enactment of material and discursive heterogeneous relations that produce and modify all actors. There is no reality outside the enactment of relations (Law, 2007). It should be noted that ANT considers the agency of non-human elements in the construction of reality to be relevant (Watson, 2007). Through ANT, the number of elements that should be the focus of analysis is expanded and actions are understood as the result of the relationship between humans and non-humans (Law & Urry, 2004). A *tecnologia social* from the perspective of ANT has transformative potential given the contingent interweaving of heterogeneous elements that are formed over time (Arimatéia, Valadão, & Andrade, 2019). In this sense, *tecnologias sociais* can be understood as a set of heterogeneous elements that are functionally connected with the aim of being built together with end users, so that they can be freely reproduced and improved (Lorenzi et al., 2021).

As Law and Singleton (2005) point out, the ANT approach, as it evolves into ANT and After, allows us to explore not only presences, but also the multiple and discontinuous absences characteristic of fluid and complex objects – such as a *tecnologia social*. Reality, according to Law (2004), consists of a topography of possibilities, impossibilities, and probabilities, in other words, a hinterland – a metaphor for the presences and absences that permeate reality. The concept of hinterland has roots in geography and colonial history and is appropriated by ANT to represent the space of foundation, support, material and relational ground that sustains a network. The work of the practice is to negotiate these territories and even to organize these spaces so that others can traverse them (Law, 2009). The hinterland is the space or context that supports the existence and stability of a given network made up of heterogeneous elements. It refers to conditions, relationships, and influences that are not immediately visible but that shape the interactions and associations in a network. In the context of ANT, the hinterland is not only geographical, but also includes the variety of heterogeneous elements that must be governed and established for the network to function (Law 2004, 2009). The concept of hinterland comes from a discussion by Law (2004) on providing new ways of thinking, practicing, relating and knowing the social, broadening and deepening the concepts of ANT. Hinterlands elucidate the region where socio-material relations are formed and how they are thought about, showing how we relate to reality (singular) or realities (multiple). Through the hinterland, the territory we anticipate as possible, impossible, probable, and improbable becomes visible, even shaping what we think in a contingent present (Haxell, 2015). In short, the hinterland emphasizes the importance of understanding the contextual and underlying factors surrounding an act or practice, showing that reality is always part of a more complex network of relationships (Law, 2004).

Another concept relevant to the study of a *tecnologia social* is that of political ontology, which refers to the way in which entities and their relationships are socially organized and constructed, revealing the implications of power and the political struggles that are at stake. This concept shows that definitions of “reality” and “truth” are influenced by social interests and power struggles (Law, 2004, 2007). The combination of ontology and politics suggests that the

conditions of possibility are not fixed in advance, but are in formation (Mol, 1999). Existing realities are constantly shaped, performed and contested, so that things can always be different (Law, 2008). Objects can be seen as a set of relations that change over space and time (Law & Mol, 2008; Law & Singleton, 2005). According to ANT, reality is the result of effects and negotiations that lead to possibilities for intervention and agency in the composition of the world (Moraes & Arendt, 2013). By questioning the traditional ways of representing reality, ANT challenges the traditional convention of politics (Alcadipani & Hassard, 2010), which considers entities and events as absolute truths or “untruths” (Latour, 2004). Conventional political decisions are made on the basis of “facts” that are presented as unequivocal. ANT, on the other hand, does not assume that entities are discrete, singular, and unproblematic, but rather are formed by a contingent interweaving of human and non-human actors (Latour, 2005). In this way, politics for ANT refers to a constant association of a temporary, uncertain, variable and multiple nature that challenges the singular and discrete view of reality. This broadens the discussion of politics and power, avoiding the dualistic debate between oppressor and oppressed, dominator and dominated, entrepreneur and proletariat, elite and people, structure and agency.

Enactment points to the active construction of reality through the heterogeneous associations that are contingently established. All actors, whether human or not, play an active role in the constitution of reality. The hinterland refers to the territory and the invisible support networks that allow certain practices to function, involving the presences and absences that influence these heterogeneous associations. In turn, political ontology examines the assumptions and implications about the nature of actors and power relations within these heterogeneous networks of actors, analyzing how power relations emerge and are maintained through the network composed of human and non-human elements. Table 1 summarizes these three concepts.

Table 1
ANT and After concepts relevant to the study of a TS

Concept	Definition	Author(s)
Enactment	Process by which reality is continuously created, i.e. through interactions between heterogeneous actors.	Latour (1999, 2005) Law & Urry (2004)
Hinterland	Broad context consisting of networks of influences that support and shape practices and actions.	Law (2004; 2009)
Political Ontology	How heterogeneous entities and their relationships are organized and socially constructed, revealing the implications of power and the political struggles that are at stake.	Mol (1999) Law (2004, 2007)

Source: Prepared by the authors.

These three concepts are deeply interrelated and provide a complex view of how reality is constructed or enacted through social practices. Enactment focuses on the actions and practices that create realities. Hinterlands are concerned with the invisible or hidden conditions that in some way foster these actions and practices. Political ontology focuses more on the power struggles that determine which realities are prioritized and legitimized. Based on ANT as a

theoretical-methodological approach, the next section describes the methodological path taken to conduct the research.

Methodological path

This research adopts Actor-Network Theory (ANT) as its theoretical-methodological basis (Arimatéia, Valadão, & Andrade, 2019; Camillis & Antonello, 2016; Camillis, Bignetti, & Petrini, 2020). In doing so, we pay attention to some principles of ANT, in which the researcher is an engaged participant and not just a neutral observer (Law & Urry, 2004), investigating what the actors do, how they do it, and why they do it (Latour, 2005). In the study of the *replication* of a *technology for the social* for entrepreneurial education, we sought to understand how this technology is adapted based on an analysis of the interactions between human actors (young people from vulnerable communities, instructors, etc.) and non-human actors (technological artifacts, ideas, interests, etc.).

First, the heterogeneous network of actors that make up the *tecnologia social* for entrepreneurial education was identified and inserted through the participation in a two-day training session for future instructors of the program. The aim was to get to know the teaching-learning methodology and content of the program. At this point it was possible to identify some of the main actors: (1) the course instructors – young people between the ages of 25 and 35 with practical experience in entrepreneurship (with or without success), (2) the students – young people from vulnerable communities, and (3) the course methodology – a non-human actor, including the teaching materials (handouts and cards) and the activities (exercises and dynamics). Participation in the training made it possible to contact the manager of the social development company and the main instructors of the course, as well as to access the teaching materials, the schedules of future classes and the lists of students who have already participated in the program.

The research was organized in three stages. In the first stage, which lasted one week, the researchers accompanied the network actors during their classes. In the second stage, which lasted three months, the research focused on monitoring the students throughout the mentoring process. The third stage involved monitoring the students after the mentoring had ended, for another period of at least three months. However, with the outbreak of the Covid-19 pandemic in the first half of 2020, face-to-face teaching was suspended. As a result, the course was offered online, on the YouTube® platform, which allowed the researchers to follow four classes from different locations: Rio Grande do Sul, São Paulo, Rio de Janeiro and Minas Gerais. This allowed the research to be conducted over a larger geographical area, while maintaining the monitoring in three stages: during the classes, during the mentoring process, and after the mentoring. The classes were monitored between August 2020 and June 2021 through social media, specifically Facebook® and Instagram®, Whatsapp®, and phone calls. Initially, 72 students were contacted, of whom 28 were monitored during classes, 22 during the classes and mentoring phases, and 18 during all three phases of the program (classes, mentoring, and post-mentoring).

During data collection, four types of notebooks were used for documentation and organization (Latour, 2005):

- First notebook: focused on documenting reactions, surprises, and field observations.

- Second notebook: focused on recording information in chronological order and refining the concepts identified.
- Third notebook: focused on recording phrases and ideas as an essay.
- Fourth notebook: focused on the impact of the written report, aiming to re-aggregate the social.

The transcription of the data was naturalized according to Oliver, Serovich, and Mason (2005), with the aim of presenting the data in a natural, objective, and precise way, and was entered into ATLAS.TI®, which allowed the storage of videos, texts (from the notebooks), images, and audio, and helped in the inductive analysis (Bignetti, de Souza, & Petrini, 2023; Bussular, Burtet, & Antonello, 2019; Wright, 2016).

The data collected were analyzed following the analysis spiral suggested by Creswell and Poth (2016). In the first stage of the spiral, the information collected was organized in ATLAS.TI®. The second stage was to re-read the data and record the insights and ideas that emerged. Based on this inductive reading, the first codes were created in accordance with the third stage of the spiral. In the first coding cycle, inductive codes were created for each piece of material obtained. This process involved identifying relevant passages in the documents and developing emerging themes from the information analyzed. As a result of this first round of coding, 33 codes emerged. After this initial stage, a second coding cycle was carried out with the aim of synthesizing the material analyzed. In this process, similar codes were merged in an attempt to integrate related concepts while discarding redundant codes. This synthesis stage is fundamental because it allows the researcher to refine their understanding of the data and eliminate unnecessary repetition, thus contributing to a clearer and more coherent analysis. At the end of the second coding cycle, 7 final codes remained: 1. student attachment to the course, 2. the motivational/inspirational aspect, 3. follow-up, 4. tools used, 5. content taught, 6. barriers faced, and 7. demographics. The last two stages of the spiral, evaluating interpretations and visualizing data to support reporting of the findings, were carried out using ATLAS.TI®.

The next section presents the results found in the light of ANT and the elements of enactment, hinterland, and political ontology.

Results

The results include the records and reports of the actors that make up a *technology for the social* network for entrepreneurial education. In order to summarize and highlight the main concepts of ANT that were visualized and analyzed during this research, we summarize the results perceived from the perspective of ANT in two main points: (1) enactment and hinterland and (2) political ontology. All the names of the actors in the network studied have been changed to preserve the anonymity of the participants.

Enactment and Hinterland

The course fulfills a certain role; in this case, it should lead to the creation of a low-cost business. The course is enacted based on the educational and technological practices that take

place in the virtual environment. The content, the interactions between students and teachers, the tools used and the way entrepreneurship is taught are actively created by the practices that structure the course. Among these educational and technological practices, five key players were identified: content, language, mentoring, certificate of completion, and technological platform. The course material guides students through the creation of a business in ten practical steps, and is written with simple vocabulary and informal language to help students carry out this entrepreneurial project.

The material is very practical. The class too, he [the teacher] talks and tells you to what to do. And then you do it and it happens, so... very good!" (Fabiana, student).

The course helped me a lot when it came to using social media to advertise; when it came to pricing; when it came to finding fixed suppliers, calculating costs; all of that helped me a lot; I started from scratch after the course. So [the course content] helped me a lot (Deise, student).

In addition, the student was offered mentoring for three months after taking the course. It should be noted that the lessons were recorded on the online platform where the course was offered, so that they could be viewed again if necessary. The course materials (handouts) were also made available on this platform. At the end of the program, a certificate of completion was issued to students who had completed all the stages, recognizing the effort made by the students and encouraging them to pursue the path of entrepreneurship. This active combination of practices that take place over time performs a reality, causes an enactment. Reality is not determined in advance, but occurs through associations and practices that are carried out.

[...] the course was very good for me, it helped me a lot, especially the counseling [mentoring], which gave me total support to start a business and work today (João, student).

I downloaded the material and I always refer to it. There's some great marketing and sales [material] and "How to boost your business with Instagram" that inspires me (Deise, student).

I really enjoyed [the course], but I'll be honest, I joined more because I wanted the *certificate*, because people tend to doubt that it's real if you don't show something. [...] [the certificate is important] to show my family that all my crazy things make sense; they "come off the page" so to speak [...] And because I also see it as an object achieved, which feels great (Hermes, student).

Initially, the course was developed to be delivered face-to-face to young people from vulnerable communities. In this modality, the classes were sponsored by government agencies in collaboration with community associations, which provided a course for a small number of

students. Over time, however, new associations were formed and new actors were identified. The coronavirus from the Covid-19 pandemic emerged as a non-human actor that had a major impact on the *technology for the social* for entrepreneurship network under study. The course began to be offered online and its target audience was expanded – anyone interested in entrepreneurship with low capital investment could take the course. As a result, the profile of students served expanded to include not only vulnerable young people, but also retirees, those unemployed before the pandemic, those unemployed as a result of the pandemic, NGO volunteers, university graduates without jobs, postgraduates with a desire to become entrepreneurs, beginners, and experienced entrepreneurs.

To complete the online course, the students used two main artifacts: the computer and/or the cell phone as a mechanism to access the online platform. In the online model, a major challenge for the course was to maintain active interaction and student engagement in class. The course was delivered on the YouTube® platform, so the teacher could not see the students. Student interaction with the teacher during the lessons, and vice versa, took place through chat available on the platform. To help the teacher interact during class, a course monitor informed the teacher via Whatsapp® of the main questions asked in the chat. In this format, student engagement was low, as Carlos, the course instructor, points out.

I can tell you very well because I was the pioneer of online, I was the first to teach online, the online lab was with me, and the first online classes were all with me. Man, the difficulty is having *interaction*. When you're talking to a student, that's what I think, both in my experience at the university and as a teacher, what enriches the class is the exchange of experiences, the examples, the interaction, there's *none of that* online (Carlos, instructor).

One of the program's instructors said that student engagement was much higher in the face-to-face class. To see what engagement was like in the face-to-face class, we looked for students who had taken the course in this mode before the Covid-19 pandemic. We found that interaction with students was easier to develop, there was the possibility of a more engaging dynamic, and there was more sharing of experiences among class members. More interaction made it easier to understand the content and strengthened the student-teacher bond, as one of the students interviewed pointed out.

In addition to these efforts, one of the teachers, Carlos, created some mechanisms to try to improve the interaction with students. It is worth noting that the teacher's efforts reflect the essence of the course, which is to promote relationships in a playful and informal way. In fact, this interaction, using simple language and a colloquial way to convey the content, even if it was hindered by the way the course was conducted online, had an impact that was reported by the students, as Fabíola points out.

[...] I liked the way he presented himself, totally, how can I say, he told his life, his experience, the way he presented himself, very relaxed, it wasn't so formal. I liked it, I thought it was nice (Fabíola, student).

In addition to the engagement factor, familiarity with the internet and social networks influenced course progress. Social networks emerged as another relevant player. Facebook®, Instagram®, Telegram® and Whatsapp® were used for market research, competition analysis and as a channel for promoting products and/or services. Mastery of these tools was more common among the younger audience, while older students, such as retirees and seasoned entrepreneurs, had more difficulty using them, for the most part discovering the application and scope of these tools.

[...] It was all very quick and that business plan was very short notice and even though it's well explained, everything online makes it a bit difficult for people who don't have a *lot* of knowledge. So I couldn't do the business plan as they suggested, and I *quit* (Gabriela, student).

By following the actors, we can see a contingent reality formed by the associations between human and non-human elements that occurred throughout the research. This constant association and dissociation between actors that form a heterogeneous network performs a reality. In turn, this performance depends on a context, often secondary and unnoticed, that invigorates and enables the creation of a reality. This context, superimposed on the heterogeneous network, is called the hinterland.

Hinterlands have a strong connection with enactment: the practices that “enact” reality depend on the infrastructures and background conditions that make these practices possible. For the course to take place, it depends on a number of technological infrastructures. In this sense, the student's access to a cell phone and quality internet, as well as access to a consumer market, postal services and means of transportation, were set as a secondary backdrop and interfered with the development of the entrepreneurial project. The course was based on the assumption that each student had a minimum of technological resources to engage in entrepreneurship, an infrastructure characteristic of large urban centers. However, by “following the actors” through different states and contexts, it was possible to see situations in which the student lived in a small town with limited access to technological resources and a consumer market, making it difficult to make the business viable in practice, as student Alice points out:

[...] I didn't even want to put it in my town; I wanted to put it in the neighboring town, which is bigger. Man, I live in a town that has a maximum of 4,000 inhabitants [...] But it's not viable at all (Alice, student).

Through the hinterland and the enactment of this *TS* for entrepreneurial education, this context in which certain practices are encouraged, it is possible to perceive a “backdrop” through which the course is produced and performed, outlined by a set of technological infrastructures. Consequently, it is possible to visualize a set of relationships made up of practices, statements and thoughts that form a contingent present (Haxell, 2015) and that help to maintain a provisionally stable reality (Law, 2004). However, the choice of one reality over another involves power relations, decisions and political implications that are discussed in the concept of political ontology.

Political Ontology

Reality is not given *a priori*, but is a political process, active in the creation of possibilities, not a predetermined and unchangeable destiny (Law, 2007; Mol, 1999). The course under analysis, a *technology for the social*, could have happened differently from the way it did online. The association between the social development agency and a private sponsor changed the nature of the course, which was originally designed to provide face-to-face training to vulnerable young people using a playful and sensitive method. According to the report by the manager of the social development agency, it was clear that the course functioned as a *technology for the social*, as it did not take into account regional specificities, differences in gender, culture, race, and local economic, historical, and social conditions in its design, application, and *replication*.

[the methodology] was really designed to cater for the same social class and even though the diversity of the culture and economic environment of the Brazilian states is very different, man... poor... in a good way, right, a vulnerable person is a vulnerable person, they all need money when they need it (Davi, manager of the social development agency).

According to the manager of the social development agency, “poor is poor,” vulnerable people are the same everywhere in the country, and a teaching methodology was developed with some general and simple guidelines that could be applied and *replicated* in all regions of the country. The discourse in defense of entrepreneurship is linked to the processes of productive restructuring and the resulting movements to make the labor market more precarious and the forms of capitalist accumulation more flexible (Betoni, 2014). The entrepreneurial discourse can be seen as a tricky way to promote processes of informalization of work and the transfer of risks to workers (Costhek Abilio, 2019). Due to fragile socio-economic conditions, high unemployment, often precarious jobs and the lack of better job prospects, “entrepreneurship” becomes a “choice” in a scenario of limitations (Franco & Ferraz, 2019). A society with such economic and social inequalities as Brazil’s raises questions about “entrepreneurship” as a “solution to unemployment,” since the chances of success are low and the conditions for developing a business tend to be precarious, as Marcelo pointed out.

[...] The entrepreneurship that reaches these people is a bit unfair, we say: “oh people are starting to engage in entrepreneurship, the most vulnerable,” we “glamorize” that a lot, as if it were a good thing, but in reality it's the only option the guy has, the rest of society won't accept him in any position (Marcelo, student).

The concept of political ontology makes it possible to see the different interests and power effects resulting from the momentary associations produced by the actors in the network under study. We can see how the heterogeneous entities (students, teachers, sponsors, social development agency, online platform, motivational speeches, etc.) are organized and socially constructed, revealing the implications of power, specific interests, and even political struggles at stake. On the one hand, there is a development agency with an entrepreneurship teaching

methodology that is eager to expand its reach and business revenue. The agency's manager defends a vision in which vulnerability is the same for all poor people and the same methodology can be applied in any context. This universalist view of entrepreneurship disregards socio-economic and cultural differences and reflects a political decision to apply a simplified solution to complex problems, in line with the interests of productive restructuring and the precariousness of the labor market. This shows how different realities (in this case, entrepreneurship as a solution to unemployment) are politically produced and imposed.

The course creates, reinforces and induces a reality in which entrepreneurship is possible for everyone through its methodology, the speeches and narratives of its teachers, managers and support staff. The course aims to intentionally influence and shape students' practices and actions. In entrepreneurial education, the outcome, creation and success of a business depends on the student and their managerial and emotional capacity, and perseverance and effort are considered fundamental characteristics for business success.

You have to work hard to achieve your goals [...]. In the course you have to try. [...] I thought it [the course] was good. Success is measured by effort. It's always been that way (Hermes, student).

On the other hand, it is possible to identify strategic omissions that were not evident in the course narratives and guidelines, such as the information related to the known low probability of success for micro-entrepreneurs when starting a new business in Brazil. In times of crisis, such as in 2008, the mortality rate for microenterprises of up to two years reached 45.8%; in times of greater economic stability, the same rate tends to decrease, as happened in 2012, when it was 23.4% (SEBRAE, 2016b). Therefore, given the global economic crisis as a result of Covid-19, it can be expected that a significant proportion of the small or micro enterprises created during this period of great recession will not survive their two-year lifespan. This unfavorable probability for the small entrepreneur was not addressed in the course, and some students reflected on this difficulty when choosing a business and the difficult probability of success. The choice to create one reality over another involves power relations, choices, and political implications.

In line with the scenario and the demand generated by the course, there are private companies that have a strategic interest in promoting investments in the social and sustainable field, since there are possible economic gains linked to a positive image for the company. In fact, the main performance indicator required by the private sponsors was the generation of new businesses, disregarding the businesses that already existed among the students and could be improved.

[...] in the private sector, the focus is on *results*; the most compelling result, the most demanded result, is that the students are doing business, objectively speaking, the guys are doing business and generating income, period. Of course, there's also a social concern, but that light [the emphasis on results] is brighter than any other. In the public sector it's more of a social appeal, the guy is happy, it's changed his life, not necessarily in large quantities and so on, but of course there's also a demand because there's a

contract and so on, but that's the feeling I get from dealing with them [the two sponsors: public and private] (Davi, manager of the social development agency).

With a results-oriented sponsor, the goal agreed upon with the social development agency was a quantitative one: to create new businesses. That is why it was advisable to have large classes, since a larger number of students increases the likelihood of achieving the established goal, given that many students drop out before completing the entire program. However, the new businesses generated by the course tend to be unsuccessful in the medium and long term. Throughout the research, it was possible to observe situations in which students, as soon as they had the opportunity, abandoned the idea of being an entrepreneur and turned to the job market.

[...] We took a break from the business... My friend [partner] was already in another job and I also got an offer... We only have the remaining stock... Since she and I have small children, we thought it best not to continue, as it would take up too much of our "available" time outside of work (Gisele, student).

[...] I ended up closing the business because I couldn't get a loan from the municipal government. I ended up finishing almost at zero. I didn't make a loss, but the profit was low [...] I'm here doing the trainees and training for a public exam (Isaías, student).

In an unequal country with a precarious labor market, political ontology highlights the power effects resulting from the associations established between the different actors in the heterogeneous network, which in a way help to perpetuate existing inequalities. In the case under analysis, two questions stand out: (1) What is entrepreneurship? (2) What is the (economic) interest of the agency and sponsors running the program? Regarding the first point, it is important to discuss and demystify a naive romanticism surrounding entrepreneurship. The field of study of entrepreneurship is complex and multifactorial; simplifying the motivations for starting a business can be detrimental to the majority of small and informal businesses that, statistically, will not succeed. Regarding the second point, it is worth questioning whether economic interest should be the main factor in sponsoring, developing or applying a *TS* for entrepreneurship education. The purpose of a *TS* is to improve living conditions and provide social inclusion, not to perpetuate historical inequalities.

Based on these results, in the next section we discuss how to bring a *technology for the social* closer to a *TS as a social construct*, seeking to deconstruct the dichotomy between the universal and contextual nature of the transfer process.

Discussion: Clues for bringing a *technology for the social* closer to a *TS as a social construct*

From the perspective of ANT, there is no distinction between the local and the global, the micro and the macro (Latour, 2005). Based on the identified global and local elements that are interrelated in the network, two issues are discussed in this section to bring a *technology for the social* closer to a *TS as a social construct*. The first question is related to the idea that the approach

depends on identifying elements of success and failure. The second question suggests that once elements of success have been identified, it is possible for a *tecnologia social* to maintain common global elements in all its *reapplications*.

Bringing a technology for the social closer to a TS as a social construct depends on identifying elements of success and failure

On the one hand, some of the actors *replicated* in all classes and locations proved to be positive: i) informal and motivational language when teaching the content; ii) simple and objective content, covering the main aspects needed to start a business; iii) three-month mentoring to support the student in the initial phase of the business; and iv) delivery of a certificate at the end of the course, formalizing the training. Throughout the research, it was possible to see that the course teachers stood out as the facilitators of the entrepreneurship methodology being taught, using relaxed and encouraging language that promoted the building of a bond between teacher and student. The simple and straightforward content, together with the mentoring, helped the students interested in starting a business in practice. In addition, the recognition of the student's efforts, through the course completion certificate, motivates, honors and legitimizes the choice to become an entrepreneur.

On the other hand, some barriers were identified related to: i) the technological platform, which led to low student engagement in the classes, ii) student familiarity with the online platform and social networks, and iii) student access to a cell phone and quality internet. It is interesting to note that the barriers identified are all non-human actors. By giving the students a voice, we found that the technological platform used (YouTube®) was a barrier to class engagement. At no point did the social development agency reconsider the use of the technological platform used. To address the low level of engagement, the course managers made some investments, such as rewarding the best project in the class with 1,000 reais. Some classes also had printed course materials sent to their homes in an effort to increase student participation. However, according to the manager of the social development agency, these actions had little impact on student engagement. Another barrier was the lack of familiarity that some students, especially the older ones, had in accessing the online universe of social networks. In the end, the course did not help the students who had no experience in using online tools. These barriers could have been overcome if local voices had been heard.

According to Dolabela (2003, 2008, 2011), there are four elements of entrepreneurial education that are relevant to fostering the development of sustainable communities and promoting social inclusion, and it is essential to consider i) human capital, ii) social capital, iii) entrepreneurial capital, and iv) natural capital. Human capital is about recognizing the student as the protagonist of their learning process and encouraging the development and pursuit of the dream of entrepreneurship, building their particular life project. Social capital encourages the student's active participation in the daily life of their community, with the aim of improving the quality of life in the community where they live and promoting the training of multipliers of the entrepreneurial program. Entrepreneurial capital demystifies the basics of entrepreneurship and allows students to see the similarities and adaptations of businesses from other places. Finally, natural capital refers to the local and specific conditions of the target audience served by the entrepreneurial education program.

The course used two of the four elements of entrepreneurial education outlined by Dolabela (2003, 2008, 2011): human capital and social capital. The first element used is that the student is an agent of their learning process and seeks to realize their dream of becoming an entrepreneur, building their life project. This process was actually carried out and was part of the teaching methodology used. In connection with another element pointed out by Dolabela (2008), the course considered entrepreneurial capital, offering entrepreneurial training through all the methodology applied, offering simple content that covered the main stages of starting a business at low cost. Through the use of informal language, along with mentoring and a certificate of completion, the course generated knowledge and minimal training to stimulate the entrepreneurial journey, encouraging the creation of their own business and allowing the student to see similarities between their entrepreneurial project and businesses already carried out elsewhere. On the other hand, the course did not consider natural capital and social capital. By not considering natural capital, the course did not take into account the particularities of each student's context and did not address the barriers that prevented better use of the course. By not considering social capital, the course ended up not enabling students to actively participate in their community. As a result, the low level of engagement is not surprising, given that some students had difficulty using the online platform and social networks, and many students dropped out before the course was fully completed.

Once the elements of success have been identified, it is possible for a tecnologia social to maintain common global elements in all of its reapplications

In most cases, the transfer of a *TS* to another region involves the application of one of two approaches that traditional research considers to be opposed: i) the universalist approach and ii) the contextual approach (Van Oudenhoven & Wazir, 1998). On the one hand, the universalist approach assumes that universal principles can be applied to a wide range of practices and situations, where diffusion effort is determined by supply. In this case, there is the process of *replicating* a *TS*, characterized by a linear and instrumental approach, aiming at predefined solutions that could be applied in homogeneous contexts. This approach aims to be authentic to the original model, defining clear program guidelines, monitoring performance standards, and identifying commonalities between different contexts, as in the case of franchise *replication* (Jowett & Dyer, 2012). It should be noted that in franchise *replication*, there is a product, service, or program standard set by a central agency that must be followed in a mandatory manner in all the places of application. On the other hand, the contextual approach emphasizes practice, initiative and local spontaneity, allowing for mutual learning and focusing on problem solving, which is very much in line with the vision of *TS* advocated in Brazil and Latin America. From this perspective, the focus is on identifying the uniqueness of each social, cultural and economic context and favoring local adaptation rather than direct and instrumental *replication* of a *TS* (Pozzebon & Saldanha, 2016; Van Oudenhoven & Wazir, 1998). In the contextual approach, the process of *reapplication* is characterized by a transfer of *TS* through socio-technical adaptations.

Investigating a *TS* through Actor-Network Theory, especially its version ANT and After, allows us to broaden the debate about the transfer of a *TS*. Actor-Network Theory's notion of network makes it possible to dissolve the distinction between macro and micro, agency and structure, subject and object. Instead of pitting the individual against the universal, or agency

against structure, the ANT approach examines how a given element becomes strategic through the number of connections it establishes (Latour, 1996). Thus, in ANT, there is no rigid distinction between a universal and a contextual approach. Through the concepts of enactment and hinterland, it is possible to see how a given contingent reality is formed: through the association of heterogeneous elements, both human and non-human. In the case under analysis, a *TS* for entrepreneurial education is initially located in a territory permeated by possibilities and impossibilities, which is also shaped by what we think in a given contingent present; this territory is called the hinterland (Law, 2004; Haxell, 2015). As we follow the actors (Latour, 2005), from the perspective of ANT, we see the associations that actually occur: the process of enactment. Through the use of ANT and its theoretical-methodological framework, we perceive a *TS* as a moving target (Blok, Fariás, & Roberts, 2020; Watson, 2007) made up of a contingent network of heterogeneous elements. The effects produced by this network can be discussed using the concept of political ontology (Law & Mol, 2008), where the different interests and power effects resulting from the associations produced by the actors of the network are now visible. In this temporary reality made up of heterogeneous and complex associations, the linear and instrumental vision of *replicating* a *TS* is transformed into a vision of *reapplying* a *TS*. From this point of view, the social construction of a *TS* can start from a pre-conceived *technology for the social*, since through successive interactions, this *TS* is kept in a constant state of change, significantly different from the one initially conceived.

The *reapplication* of a *TS* takes into account the socio-technical adaptations that occur in this process (Pozzebon & Saldanha, 2016), dissolving the dichotomy between universal and contextual. Through the analysis of ANT, it was possible to gain an in-depth understanding of the constitution of a network of actors and the resulting effects. In the ANT approach, the universal is linked to the local (Latour, 2005). Global and contextual elements, in a *reapplication* of *TS* through ANT, are in constant coexistence, with a constant exchange of information, adaptation and transformation. While *TSs* need a standard to be taken to other places, they also need a flexible model that allows for local adaptations (Lassance Júnior et al., 2004). Therefore, from the perspective of ANT, the *reapplication* of a *tecnologia social* takes place in an interrelated way, connecting different places and times. It should be noted that, by looking at the context, *reapplication* converges with the perspective of *TS* defended by the Latin American approach (Dagnino, 2014; Fonseca, 2009). The consideration of universal and contextual elements in *reapplication* is also in line with the feasibility of *reapplication* proposed by Lassance Júnior et al. (2004) and the RTS Constitutive Document (2005). In addition, the *reapplication* of a *tecnologia social* for entrepreneurial education from the perspective of ANT is consistent with the networked *reapplication* proposed by Jowett and Dyer (2012). Networked *reapplication* aims to maintain the core aspects of the original technology when it is reapplied, but allows for adaptations according to local needs. In this scenario, the focus is not only on local adaptation, but also on the formation of a network of actors that allows for multidirectional communication and learning, forming a network of organizations from different locations that work from an original concept (Jowett & Dyer, 2012). Finally, *reapplication* from the perspective of ANT transcends network *reapplication*, as it can take into account the influence of non-human actors (semiotics of materiality) and other assumptions of Actor-Network Theory, such as the concepts of enactment and hinterland, as well as political ontology, which allows the formation of the heterogeneous network to be analyzed in a critical and political way. These theoretical assumptions have guided this research in identifying

and analyzing local socio-technical readjustments and the heterogeneous network involved in bringing a *technology for the social* closer to a *TS as a social construct*, and serve as the basis for the model proposed in Figure 1.

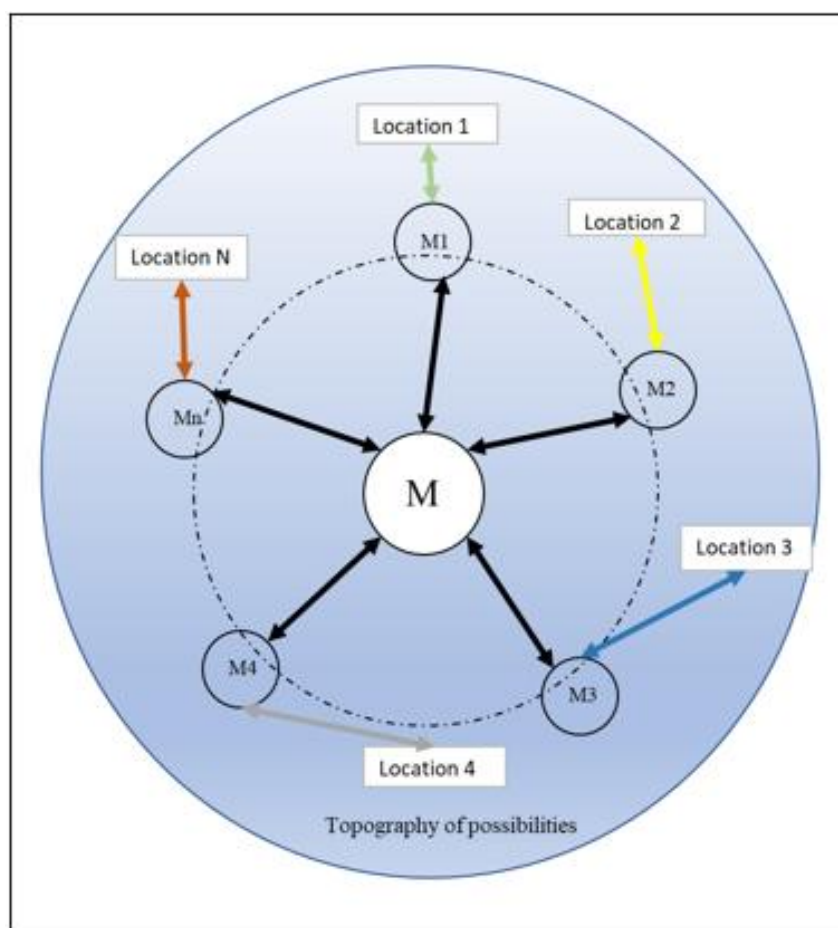


Figure 1. Model for *reapplying* a tecnologia social from an ANT perspective

Note: M1: methodology adapted to location 1; M2: methodology adapted to location 2; Mn: methodology adapted to location n.

Source: Prepared by the authors.

The course under analysis was initially *replicated* through the franchise strategy and only the global aspects were considered. Once identified, the elements of success become part of a hard core that we call the methodology (M). M consists of global elements (universal approach). The local elements (contextual approach) are shaped by each interaction with different locations and communities. As a result, the hard core of the methodology (M) is shaped by the local, forming a hybrid of the universal element with contextual elements. The methodology (M) is adapted and transformed into M1, M2, M3, M4 and Mn in order to accommodate the local. By feeding back into the original methodology (M), the adaptations promote a constant flow of information and learning capable of serving specific communities. It should be remembered that, according to Actor-Network Theory, reality is multiple, and this process of *reapplication* takes

place simultaneously, in several regions at the same time. The realities represented in Figure 1 by location 1, location 2, location 3, location 4 and location n coexist and overlap. For example, classes held in Manaus, Fortaleza and Porto Alegre lead to specific adaptations to the needs of each region, resulting in M1 (Manaus), M2 (Fortaleza) and M3 (Porto Alegre). At the same time, each location can influence other locations (location 1 influences location 2 or location 3, for example) and vice versa. In this proposal, the universal element is permeable, i.e. an edition of the course in Manaus, when *reapplied* to another municipality of the metropolitan region, already has contextual aspects incorporated into the universal element.

The local elements are the result of listening to the different contexts and can therefore be more or less present depending on where they are *reapplied*. In our research, the preference for a new online platform that allows interaction between students and teacher would become part of the universal element (M), since the barrier to engagement was present in all the classes studied. On the other hand, a more introductory module on the use of social networks would be part of the Mn methodologies, as this was a need identified in more rural locations.

Adaptations should also look at other associations in the network being studied, emphasizing local participation in solving specific problems. For example, former students of the course could be identified and developed to take the lead as future teachers and mentors in the program, in line with the Dolabela's (2008) social capital element. Such an adaptation not only strengthens community participation in a legitimate way, but from a political ontology perspective can also be a mechanism for deconstructing established narratives that serve interests other than those of the community.

Conclusions

Analyzing a *tecnologia social* through the eyes of ANT allows us to identify global and local elements interwoven in a heterogeneous network of actors (human and non-human). The entrepreneurial education program studied was guided by a universal approach of *replication*, such as the platform chosen to run the classes, the method used uniformly, and the model of mentoring for a predetermined period of time. A *technology for the social* being the starting point for a *TS as a social construct* implies allowing intense interaction and participation from the community to which the course is directed, so that the community (local element) takes ownership of the course (global element). This dynamic can become part of the entrepreneurial education program. In this way, it is possible to *reapply* the course in the same location through the active role of the local community, so that they are not seen as a peripheral and secondary axis of the course, but as a central and protagonist axis. It should be added that in order to *reapply* a *TS* for entrepreneurial education, it is recommended that it includes aspects of citizenship, encouraging an ethical attitude and the use of appropriate language. It is important to build social capital and rely on the cultural roots of the community, being an agent of cultural change and promoting the foundations of cooperation, networking and democracy (Dolabela, 2003), promoting association with the diversity of contexts in which they operate and empowering vulnerable communities.

By using ANT to study the issue of *reapplying* a *TS*, this study has highlighted the influence of non-human actors in the network under study (semiotics of materiality), as well as the

relevance of concepts such as enactment, hinterland and political ontology when thinking about a process of *reapplying* technology, bringing a critical and political character to the analysis. In this way, this study shows a practical application of the use of ANT when investigating a *TS*, expanding the understanding and repertoire already pointed out by research that relates these two topics (Valadão, Andrade & Alcântara, 2019; Lorenzi et al., 2021). From the theoretical-methodological approach of ANT, it is possible to see the relevance of the composition of the enactment (Watson, 2007) and the influence of the hinterland (Haxell, 2015) in the formation of the network of actors studied. The reality that is not given *a priori*, but a political and active process in the creation of possibilities, allows us to discuss the concept of political ontology (Law, 2007; Mol, 1999; Alcadipani & Hassard, 2010), debating, in the case under analysis, what constitutes entrepreneurship and what are the interests of the agency and sponsors that operate the program. The process of building a *TS* for entrepreneurial education in the community involves noticing and frequently asking what associations are being established and reinforced (political ontology) in this network and what effects and results this heterogeneous network of human and non-human actors is producing (enactment), in other words, it is a process that is constantly under construction.

Finally, the article summarizes two discussion questions that provide clues as to how it is possible to reach a *TS as a social construct* based on a *technology for the social*. Our proposal challenges the dichotomy present in the two transfer approaches presented in the literature, one of a universal nature and the other of a contextual nature, and shows, through the non-dissociation of the global and the local proposed by ANT, that this approach is possible. In this sense, this study contributes to the study of science, technology and society in Latin America (Marques, Costa, & Holmes, 2014) by showing the relevance of concepts, theories and technologies that cannot be understood or *reapplied* without connecting them to contingent realities and a heterogeneous network of actors.

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Inclusive language

The authors use inclusive language that acknowledges diversity, conveys respect for all people, is sensitive to differences, and promotes equal opportunities.

Authors' contributions

First author: conceptualization (lead), data curation (lead), formal analysis (equal), investigation (lead), methodology (lead), project administration (lead), resources (equal), validation (equal), visualization (equal), writing – original draft (lead), writing – review & editing (equal).

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