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Digital transformation in university technology expo

Transformação digital em feiras tecnológicas universitárias

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Abstract

Purpose: The aim of this article is to explore the Innovation and Entrepreneurship Fair held by the Technological Sciences Center of the Regional University of Blumenau (Universidade Regional de Blumenau [Furb]), to describe the relevant factors in its execution through the digital environment.

Originality/value: This study presents elements to understand the conditions of implementation and the challenges involved in holding technological fairs within the scope of higher education organizations through information and communication technologies (ICT).

Design/methodology/approach: Qualitative research with a descriptive-interpretative approach. The descriptive approach consisted of observing facts and procedures adopted within the scope of a higher education institution. The interpretive approach examined that the facts and procedures that constitute the object of study presuppose the intersubjective context from which the observation was made.

Findings: The study allowed us to recognize that the Innovation and Entrepreneurship Fair, held over seven years at the Center for Technological Sciences of Furb, has adapted to digital media in its eighth and ninth editions. Due to the need to follow health and safety protocols during the Covid-19 pandemic, this initiative added to the fact that it is the first major Furb event held entirely in digital form. It presented logistical challenges to make practices and processes compatible with the environment and resources of the world wide web.

Keywords: digital transformation, university, digital fair, innovation, entrepreneurship

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Resumo

Objetivo: Explorar a Feira de Inovação e Empreendedorismo realizada pelo Centro de Ciências Tecnológicas da Universidade Regional de Blumenau (Furb), a fim de descrever os fatores pertinentes à sua realização por meio digital.

Originalidade/valor: O estudo apresenta elementos para compreender as condições de implementação e os desafios que envolvem a realização de feiras tecnológicas no âmbito de organizações de ensino superior, por meio de tecnologias de informação e comunicação (TIC).

Design/metodologia/abordagem: Trata-se de pesquisa qualitativa de abordagem descritivo-interpretativista. É descritiva porque consiste em produto de observação de fatos e procedimentos adotados no âmbito de uma organização de ensino superior. É interpretativista porque considera que os fatos e procedimentos que constituem o objeto de estudo pressupõem o contexto intersubjetivo a partir do qual a observação foi realizada.

Resultados: O estudo permitiu reconhecer que a Feira de Inovação e Empreendedorismo, realizada ao longo de sete anos no âmbito do Centro de Ciências Tecnológicas da Furb adequou-se ao meio digital nas oitava e nona edições do evento. Essa iniciativa, decorrente da necessidade garantir a segurança diante da pandemia da Covid-19, além de ser o primeiro grande evento da Furb realizado integralmente em meio digital, implicou desafios logísticos no sentido de compatibilizar práticas e processos presenciais com o ambiente e os recursos da rede mundial de computadores.

Palavras-chave: transformação digital, universidade, feira digital, inovação, empreendedorismo

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INTRODUCTION

In recent decades, digital platforms have increasingly challenged teaching, research, and extension activities. In many ways, information and communication technologies (ICT) have directly and indirectly impacted teaching-learning processes, transforming habits and values. Many of the ideas and artifacts that make up the general framework of this reality were born in universities.

Being a place of knowledge production, the university is also known as an environment of plurality, multidiscipline, and dialogue between theory and practice that boost human, scientific, and technological development. In this space, the realization of exhibitions and fairs assume particular relevance because they offer conditions for communication and exchange of knowledge and experiences. These events enable the public to become aware of the universities' scientific and technological products developed. Society's look beyond the academic environment provides opportunities to transfer technology to the productive sector. It also provides feedback in the research and development environment with evaluative observations that contribute to improving products and processes exhibited.

Aiming to align its activities with market demands, and fostering innovative entrepreneurship, the Center for Technological Sciences (CCT) of the Regional University of Blumenau (Furb), in the state of Santa Catarina, Brazil, has promoted an exposition for eight years in which students can act as exhibitors, perform *pitches* and compete for awards. Proposals of innovative products and services developed in disciplines that integrate the articulating axis of technological courses are presented to the public.

In 2020, the expo had to be held digitally. This required readjustment so that it would be possible to make face-to-face practices and processes compatible with the environment and resources of the world wide web.

Considering that this reality can be replicated and improved, the present study assumes the following question:

- Considering the experience of the Innovation and Entrepreneurship Expo promoted by the CCT of Furb, what are the contributing factors for fairs of this segment to be held digitally?

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THEORETICAL FOUNDATION

Digital transformation

Social and economic development is observed from the factors that led to the transformations of the productive processes. Manufacturing on an industrial scale became feasible at the end of the 18th century with the steam engine, accompanied by the textile industry and metallurgy. One hundred years later, electricity, the internal combustion engine, scientifically based chemicals, and the beginning of communication technologies, when the telegraph and the telephone were invented (Castells, 2010).

However, in contrast to the mechanical and electromechanical bases, information technologies from microelectronics offered a singular convergence revolution, enabling the harmonization and integration of many different disciplines and technologies (Schwab, 2016).

Shannon (1948) proposed the term *bits* (binary digits) to designate the information measurement unit. At the technical level, the binary representation (zero/one) of distinct physical states enabled numerous objects, informational elements, structures, and quantification of data.

Castells (2010) considers that the digital paradigm reveals a circular dynamic in which information is employed to develop artifacts, to deal with data. For Schwab (2016, p. 13), the breadth and depth of the fourth industrial revolution are based on the digital revolution that "combines various technologies, leading to unprecedented paradigm shifts in the economy, business, society, and for individuals." In this framework, informational technologies invade all production spaces and systematically integrate human activities.

The concept of "digital" has become part of the culture as a possibility for creating and using languages aimed at technological mediation, thus constituting a repertoire of practices and differentiated knowledge. Mahraz et al. (2019) point out three characteristics of the digital transformation: *irreversibility*, to the extent that the renunciation of the use of new technologies is practically unthinkable for many; *inevitability* to the extent that the global scenario of economic activities makes the use of new technologies a determining factor; and *unpredictability*, to the extent that the rapid pace of technological development makes it difficult to accurately recognize the effects on the adoption of new practices and technical tools.

Cyberculture, according to Lévy (1999, p. 17), corresponds to "a set of techniques (material and intellectual), practices, attitudes, ways of thinking

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and values that develop along with the growth of cyberspace" and, in turn, "the means of communication that arises from the global interconnection of computers." The word "cybernetics," adopted by the mathematician Norbert Wiener in 1948, became very popular from the employment of its abbreviation as a prefix to refer to the new and contemporary period during the second half of the 20th century (Martino, 2015).

Wiener's cybernetics (1978) considered information as the fundamental unit of control in the relationships between the elements of a system (whether human beings or machines). If "the medium is the message," as McLuhan (1964/2013) stated in the mid-twentieth century, the digital transformation comprises a cognitive mutation that goes beyond the eminently instrumental level.

Practices and values change based on the possibilities offered by the digital environment. This means that digital platforms are not just tools at users' service but semiotic structures that provide different opportunities for communication.

A simple example that illustrates this argument is the process of translation. Every message is produced from codes integrated into the time and place of their respective idiomatic communities. The words employed in one language represent aspects of cultural life that may not find equivalence in others. For Flusser (2004, p. 128), "each language is a different world, each language is a whole world, and different from every other language". The translator, then, assumes a relevant role in making the most appropriate choices to make the translation compatible with the meaning of the translated text. The translator takes an essential role by mediating communication between distinct idiomatic media.

The same phenomenon operates in multiple layers in the communication process, which is always a "mediated" process. What is usually called "virtual environment," "*online,*" or "digital" comprises one of these layers, in which numerous platforms correspond to languages. In this sense, Lévy (1999, p. 22) considers that images, words, and their constructs "become entrenched in human souls, provide means and reasons for living to men and their institutions, are recycled by organized and instrumentalized groups, as well as by communication circuits and artificial memories." Lanier (2012, p. 20) notes that technologies correspond to "extensions of being" that imply structures from which the vision of "self" and the world are transformed.

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Computers connected in a distributed[1] and global way have profoundly impacted the structures of organizations, providing conditions for greater flexibility, dynamism, and communicative integration.

Technological convergence induces a growing interdependence and a shared logic of information generation. Even though the digital revolution has flourished, "especially in institutions less attached to centralized forms of control" (Sennett, 2006, p. 12), a recent study conducted by the Global Center for Digital Business Transformation (2019, p. 5) points out that, from 2015 to 2019, there was a growth from 27% to 88% in the perception of how significant Digital Disruption is for organizations.

The challenges of digital transformation for any organization can be grouped into three levels: the transformation of customer experiences, the transformation of business processes, and the reinvention of business models (Mahraz et al., 2019).

From the systematic review carried out by Mahraz et al. (2019), the citation of Liere-Netheler et al. (2018) stands out in the sense that the new digital technologies, among them social media and mobile devices, provide opportunities for significant business improvements, such as improving customer experience by simplifying operations, or from the creation of new business models.

In this sense, the digital transformation also significantly impacts the higher education organizations, changing their practices and curricular structures. Autio et al. (2021) note that the characteristics of digital technologies, especially their programmability, their elemental nature as infrastructure, and intangibility, increase the resilience of organizations in the face of disruptive events, as is the case of the pandemic Covid-19.

University, entrepreneurship, and technological extension

Entrepreneurship has always been linked to economic movements related to organizational changes and society. Filion (1999) states that Cantillion, in the 18th century, already defined entrepreneurship as people who glimpsed profit opportunities and assumed the risks of these operations. However, entrepreneurship already had in its concepts the economic development associated with innovation and having entrepreneurs as agents of change, which is described in the work of Jean-Batiste Say (Filion, 1999).

[1] On distributed network topography, it is recommended to consult the germinal work of Paul Baran (1964).

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Entrepreneurship and entrepreneurial culture seek to innovate constantly, creating a virtuous circle of wealth generation and well-being for the nation (Dornelas, 2008; Dolabela, 2009). One can no longer speak of the development of organizations and society without configuring entrepreneurship as one of its sources and drivers of innovative actions.

According to the Oslo manual, innovation is defined as the introduction of a new or significantly improved good or service, concerning its characteristics or intended uses, or the implementation of new or significantly improved production, distribution, marketing, or organizational methods or processes (Organisation for Economic Co-operation and Development [OECD], 2018; Law no. 10.973). This concept determines the actions of organizations and entrepreneurs around the world.

In complementary visions, different actors must integrate the environment in which they are immersed for innovation to be effective in public or private organizations. In this context of integration, the Triple Helix corresponds to the model presented in different contexts to bridge gaps between theory and practice, society and academia, and research and purposes. In these environments, universities, industries, and governments relate to developing successful innovation strategies that reduce the gaps mentioned, balancing the interests of each institution (Etzkowitz & Zhou, 2017).

The university assumes a relevant role in this scenario, transforming the surrounding reality and itself. Etzkowitz and Zhou (2017, p. 25) state that:

> In contrast to theories that emphasize the role of government or business in innovation, the Triple Helix focuses on the university as a source of entrepreneurship, technology, and innovation, as well as critical research, education, and the preservation and renewal of cultural heritage. It is the introduction of this third element, the university/academia, dedicated to the creative production and dissemination of new knowledge in the form of ideas and technologies, that constitutes the "great transformation" of the current era – after the great transformation of the eighteenth century, which created the government-industry double helix, with its two formats: the statist and the laissez-faire. Contrary to pessimistic predictions of academic decline, the Triple Helix thesis holds that the university enhances itself and its role in society by integrating in a productive relationship new missions to old ones and vice versa. The academic world is entering the era of the entrepreneurial university.

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Globalization and interdependence in the fields of science and technology, combined with already institutionalized innovation policies in many countries, as a consequence, present the improvements in the stages of advantage of global value chains, as well as attract investments and businesses related to innovation, research, and development in different segments that ultimately translate into value and job creation (OECD, 2014).

In economies that are increasingly based on knowledge assets and increasingly large and mobile flows, their retention becomes advantageous for the environments where they are born. In this case, universities become attractors of investments and no longer only trainers of skilled labor.

Perkmann and Walsh (2007) relate the generic economic and social benefits of universities, such as education, creation of a critical scientific knowledge workforce, to the infrastructures required for industrial innovation when coupled with open innovations.

Thus, environments are created in which small and medium enterprises can emerge with potential for valorization in the global chain through the attractiveness of research systems, which can be fostered by the members of the triple helix, including companies and governments, thus closing the extension role of universities (Leydesdorff, 2005; OECD, 2014).

From Resolution no. 7 MEC/CNE/CES, of December 18, 2018, the conception and practice of the Guidelines of Extension in Higher Education are structured as being: dialogical interaction of the academic community with society for contact with complex contemporary issues present in the social context; citizen training; production of changes of the higher education institutions (HEI) in association with the application of knowledge; articulation between teaching/extension/research, in a pedagogical process involving interdisciplinarity, educational, scientific, cultural and technological policy.

For Isaac et al. (2012), there is a distinction between university extension and technical extension, although it is understood that universities can and should also assume the role of technological extension. A technological extension is understood as to how technologies are disseminated from their first introduction (OECD, 2018). It often consists of simple, low-cost, and high-impact actions, such as those in the innovation and entrepreneurship fairs that can occur in academic circles, from the encouragement given to students to employ their knowledge in something innovative. Thus, it is inserted in the context of the university ecosystem focused on entrepreneurship, allowing the availability of assets, infrastructure within the campus, curriculum, and stimulus to leadership as the role of the entrepreneurial university (Rideout & Gray, 2013).

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In this context the components of the entrepreneurial university include entrepreneurship education, methodologies that favor entrepreneurial teaching that can integrate relationships with incubators, technology parks, and innovation centers (Markuerkiaga et al., 2014; Moraes et al., 2020).

METHODS

The research presents a qualitative nature and a descriptive-interpretative approach. Burrell, Morgan and Tomazette, Prolo et al. (2018, p. 32) state that "the main focus of interpretation lies in developing a theory for the social explanation of reality, considering the point of view of human actors."

The study's descriptive approach is characterized by fact observation, recording, analysis, and classification (Triviños, 1987; Andrade, 2002; Beuren, 2004). This is an observation predominantly conducted through documents that constitute, from reports and institutional records related to the university and the fair, to digital documents (banners and videos) maintained in the online platforms used, which comprise the very materialization of the event in digital media. Marconi and Lakatos (2010, pp. 157–159) inform that documentary research involves the observation of "[...] documents, written or not, constituting what is called primary sources." As for the secondary documentary sources also used in the research, these include "books, magazines, newspapers, loose publications, and theses, whose authorship is known."

According to Schwandt (2000), the interpretivist study points out that what differs a social fact from the understanding of physical objects is that the first presupposes culturally constituted meanings. To understand the social facts, it is necessary to consider the factors related to the production of meanings, which ultimately concern the context and the study's objectives.

It is understood that social phenomena are possible based on "qualitative rather than quantitative methods, to obtain intersubjective, descriptive, and comprehensive knowledge, rather than an objective, explanatory and nomothetic knowledge" (Santos, 1988 as cited in Prolo et al., 2018, p. 32). The communicative intersubjectivity guides the attributes of social reality, a reality that is always interpreted and described under conditions of time and place.

Considering these premises, the study describes the didactic-pedagogical parameters admitted in entrepreneurial teaching at the CCT of Furb, and

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the factors that led to the implementation of Innovation and entrepreneurship fairs. Due to the Covid-19 pandemic that began in early 2020, the study seeks to describe under what conditions the ICT enabled the realization of the innovation and entrepreneurship fairs to take place in digital form.

RESULTS

University technological extension through innovation and entrepreneurship fairs at Furb's Center for Technological Sciences

The curricular organization of a course is configured as a system that keeps its elements in articulation, moving away from the tendency to establish the curricular conception of training from the simple distribution of subjects in a grid. As prescribed in the political pedagogical project (PPP) of the undergraduate program of Furb (2006, p. 14), the concept of the curriculum provides a "[...] articulated set of actions of teaching, learning and evaluation with political and pedagogical intentionality, aiming at the constitution of the subject through diverse learning."

The PPP for graduation at Furb proposes curricular organization in the form of three different axes: general, articulation, and specific, which meet the principles and guidelines that guide the structuring of curricula at the university.

Considering the pillars of teaching, research, and extension from Furb's institutional guidelines, the CCT establishes articulation disciplines as those whose theme is specified in the Entrepreneurial Project of Sustainable Technological Base, with a minimum class load of 180 hours.

The general axis consists of standard and integrated spaces for study around themes or subjects based on the demands indicated by society and the academic community. It aims to promote understanding of the meaning of higher education and the interaction of academics and teachers from different areas of knowledge through experiences in the University. This axis is compulsory in the composition of the curricular matrix of all undergraduate courses at the University. It is composed of a minimum workload of 252 class hours. Of these, 144 class hours are devoted to compulsory subjects: University, Science and Research, and Contemporary Social Challenges. These subjects, given their nature, are inserted in the early stages of the course grid, thus also meeting the premises of the PPP of the University

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graduation. In addition to these subjects, students must also choose one of the following 72 h/y subjects: Scientific Language, Ethical Dilemmas and Citizenship and Communication and Society. Contemplates 36 class hours of Academic-Scientific-Cultural Activities (AACCs).

The articulation axis is defined in the PPP of the Graduation in the following terms: it is constituted of common and integrated spaces of studies around themes or disciplines indicated through demands of the areas of knowledge of the university. It also aims to broaden and deepen the discussion of aspects highlighted in the general axis, focusing on the area of knowledge. Furthermore, it should promote interdisciplinary activities to articulate courses around common teaching, research, and extension projects (Furb, 2006, p. 32).

The specific axis aims to meet the needs of the desired graduate profile, acting in the formation of knowledge required in the national curriculum guidelines for engineering courses defined by the Brazilian Ministry of Education. Therefore, the matrix is developed through disciplines contained in the curriculum and complementary activities (AACC's).

The objectives of the articulation axis are to develop the entrepreneurial capacity of academics and teachers; to articulate the various contents and courses of the CCT through multidisciplinary work involving scholars and teachers; to build an entrepreneurial project based on sustainability (social, economic, and environmental) through short and long-term vision.

These objectives guide a profissiographic profile for capacities such as designing and analyzing systems, products, and processes, developing solutions and understanding administrative, legal, socioeconomic, and other problems, and finally, demonstrating an entrepreneurial spirit.

It is noted that the objectives are practical when it is possible to align training with entrepreneurial skills and the possibility of articulating knowledge in different courses through multi/interdisciplinary work involving students and teachers (Resolução nº 7 MEC/CNE/CES, 2018).

Project development disciplines are offered in all CCT courses according to their curricular matrix and aim to develop projects based on the market opportunity previously identified.

These subjects take on a multidisciplinary approach according to the curricular matrix of each course. In the penultimate semester, the discipline of Sustainable Technology-Based Entrepreneurial Project II is foreseen, offered jointly to all CCT courses to prepare a business plan with a multidisciplinary focus. The last semester includes the final presentation at a Products and Opportunities Expo or a course conclusion paper.

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This articulation design changed the workload by joining entrepreneurial projects between I and II in a single discipline for all courses. This change contributed to a more comprehensive approach, enabling the Opportunity Fair, previously promoted every semester, to be held annually, providing a better improvement of the projects developed by the students and a better synergy of the courses.

Environments for disseminating entrepreneurship and innovation are moments of opportunity analysis, where knowledge transfer networks are formed to improve and test these before the market. One of these moments is the Entrepreneurship and Innovation Expo, existing in different formats in HEI. These fairs demonstrate the university's insertion into the community, enabling the academics to transform their ideas into opportunities and viable new businesses (Rideout & Gray, 2013).

Furb's Innovation and Entrepreneurship Expo is a space for the presentation of innovative solutions developed by students in their disciplines of the CCT articulation axis, offering an opportunity for exchanges of experiences for innovation in science and technology, held biannually from 2016. Initiatives in this sense present adherence with Resolution no. 7 MEC/CNE/CES of December 18, 2018, which establishes the guidelines for extension in Brazilian higher education.

The objectives of the Expo are: to stimulate interest in the development of science, technology, and innovation among students of the CCT courses, administrative technicians and university professors, and the community in general who participate in the event; to exhibit the result of projects elaborated in the classroom and aimed at innovative solutions for the internal and external communities of the university; to provide spaces for the exchange of innovative experiences among the CCT courses, administrative technicians and university professors and the community in general who participate in the event; to stimulate the actors involved in the Expo for entrepreneurial and innovative creativity; to concretize the axis of articulation of the CCT and the expo proposed in this axis.

The projects presented at the expo are obtained from the disciplines of the Articulation axis of the courses. Each project is developed and submitted by a student or team composed of a maximum of five members. Participation in the innovation expo of the CCT consists of presenting the project in the form of a face-to-face exhibition. The students present an entrepreneurial proposal (with the support of a poster, banner etc.) in the form of a business plan and a prototype. The prototype is not mandatory but a critical support tool for the participants of the expo to better understand the projects.

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The choice of the best projects involves the participation of teachers, experts, and students. There is also the most voted by the expo visitors. During a period, the teams present their projects to the appointed evaluators (composed by teachers of the CCT). From this phase, the ten projects with the highest score and the project most voted by the expo participants, totaling 11, go to the final phase in which each team presents its proposal in *pitch* format for an external board of examiners, resulting in the classification of the three most viable and innovative projects, considering the score assigned by the board of experts *ad hoc*.

From 2017 to 2018, the expo relied on the Brazilian Support Service for Micro and Small Enterprises (Sebrae-SC)' resources that, in partnership with the university through the startup Furb project, allowed the financing of the event, which until then (2016) was held with Furb resources. Starting in 2019, the Innovation and Entrepreneurship Expo will have annual editions with sponsorship from local organizations.

Expansion of the Innovation and Entrepreneurship Expo to the city of Blumenau

The numbers of the editions of the Innovation and Entrepreneurship Expo are significant. Until the first semester of 2020, the expo has counted an average of 45 projects per edition, with the participation of 360 direct students and 3500 people in the events held so far.

The Innovation Expo began to integrate entrepreneurship and innovation actions of the Center of Applied Social Sciences (CCSA), involving other courses such as Administration, Economics, Technology in Marketing, and Tourism, further materializing its multidisciplinary character and objective of transformation through education.

Likewise, in 2019, in an unprecedented initiative with support from the municipal government and sponsors from the local private industry, the Innovation and Entrepreneurship Expo expanded its scope. Thus, in the second half of 2019, the first Innovation and Entrepreneurship Expo of Blumenau was held (Arrabal et al., 2019).

The 1st Innovation and Entrepreneurship Expo of Blumenau, held in September 2019, was a space for the dissemination of innovative solutions, whether these are products, services, or business models, developed in educational institutions of Blumenau, with a view of fostering Innovation and Culture of Intellectual Property in the city. This year the Technological Innovation Agency (Agit) proposed a similar event for the academic community.

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However, considering the University's commitment to promote the development and strengthen relations between the institutions of the environment in which it is inserted, the agency expanded the scope of the proposal, incorporating the participation of the external community.

Thus, the event was modeled to integrate student's projects from educational institutions of Blumenau and to obtain training on innovation and entrepreneurship. Two categories were created for the submission of proposals:

- *Category 1 – University*: for undergraduate and postgraduate students and graduates, teachers, and technicians linked to HEI of Blumenau.
- *Category 2 – Young inventor*: for elementary school students and high school students from public and private schools in Blumenau.

The event opened with lectures by the professor Ana Cláudia Donner Abreu, Ph.D., on "Innovative entrepreneurship: from the idea to the business environment" and the President of the Foundation for Support to Research and Innovation of the State of Santa Catarina (Fapesc), Fábio Zabot Holthausen, with the speech "Regulatory Framework for Science, Technology, and Innovation."

The first Innovation and Entrepreneurship Expo of Blumenau had 82 works enrolled, 18 of which were in the young inventor category, coming from elementary and high schools, and 64 works from the university category. These projects involved 224 inventors and entrepreneurs, three HEI, and nine schools in Blumenau. In addition to the lectures and project presentations, the expo also provided training for the participants and the community. The free courses were about "Strategies for Protection of Innovative Projects" and "Innovative Business Plans."

Expansion of the Innovation and Entrepreneurship Expo to the digital environment

In 2020, the Covid-19 pandemic dramatically altered the lives of every individual around the world and impacted the way people work and learn. In response to this, *online* learning became the key to developing their skills. Schools implemented solutions via digital platforms to address the crisis. Similarly, many economic activities have taken advantage of digital technologies and intelligent working arrangements (OECD, 2020).

Strengthening society's digital skills and improving access to *online* learning opportunities is key to meeting future challenges. Its importance

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will be intensified in the turbulent post-Covid-19 world. From initial to higher education and adult learning, ICT open the door to countless learning opportunities, available anytime, from anywhere, and to anyone (OECD, 2020).

In schools, new technologies can support the development of 21st-century skills, facilitate innovative learning and personalize learning, respecting differences and potentialities. For adults, digital resources expand opportunities to acquire knowledge and develop skills flexibly, at any time of life, for work-related purposes, or just for the pleasure of learning (OECD, 2020).

Considering this context, the Innovation and Entrepreneurship Expo, in its edition of the first semester of 2020, adapted its format to fit the pandemic being experienced in the year 2020, being the 8th edition of the Innovation and Entrepreneurship Expo of the CCT-Furb and 1st in the *online* format, held on July 1-3, 2020. Consequently, the 9th edition was also held in this format and took place on November 17-19, 2020.

The form and conditions for enrollment relied on an announcement whose main guidelines are described in Table 1:

Table 1

Main guidelines of the Innovation and Entrepreneurship Expo call for proposals

Question	Guidelines
Concept of innovation	Introduction of novelty or improvement in the productive or social environment that results in new products, processes, or services (Law no. 10.973/04: Innovation Law).
Virtual space	There will be spaces available in the official profile of the Expo on Instagram (@fie.cct) created for the dissemination of the works on 11/17/2020 and 11/18/2020
Exhibitors	The projects presented and that will participate in the Expo will be selected by the teachers of the disciplines of the articulation axis of the CCT courses, also open to teachers of other disciplines, including high school and post-graduation courses in the scope of Furb.
Characteristics of the papers/presentations	There is no script for the presentation of the work. However, it is essential that students present a business idea (electronic format and *pitch*) based on a form of presentation, such as business planning, a working prototype, or even the flow of understanding of the business or proposed solution.

(continue)

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Table 1 (conclusion)

Main guidelines of the Innovation and Entrepreneurship Expo call for proposals

Question	Guidelines
Characteristics of the papers/presentations	The works exhibited must comply with the deadlines and formats established in the official schedule. In the form of a standard cover, standard banner (only the header is standard), and video in a *Pitch* with a maximum of three minutes. The videos should be recorded horizontally due to the platforms they will be broadcast. Creativity is the keyword. There is no standard, no model. The following will be made available: 1. a standard *template* for the cover page; 2. an indicative *template* for making the banner; 3. basic instructions for preparing presentations in *pitch* format.

Source: Furb (2020).

The 8th and 9th editions were held entirely through digital platforms. The Instagram platform (https://www.instagram.com/fie.cct/). Of the 11 finalists, ten were selected by professors from the University, and one project was selected based on the highest number of "likes" on the platform. The evaluation of the teachers was performed from a form in the Microsoft Forms platform (https://forms.microsoft.com/), structured with the following criteria:

Table 2

Project evaluation criteria

Criterion	Weight
1) Originality and creativity in the use of the proposed solution and its degree of innovation	3,0
2) Relevance of the innovation potential and use by the target audience	3,0
3) Potential applicability of the proposed solution, considering its environmental impact and degree of contribution to solving industrial, business, and social problems	3,0
4) *Pitch* presentation	1,0

Source: Furb (2020).

The event was held live on award night through the Microsoft Teams platform with simultaneous broadcast on the YouTube Channel of Furb's Technological Innovation Agency. The competitors were evaluated by an

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external panel consisting of five members (from academia and the business sector), videos, and a brief speech defending the project following the "*pitch*" model. After the video, the external judges of the university asked the teams questions to clarify doubts regarding the proposals. They then carried out voting and observed each project's business plan.

The Innovation Expo was made possible in the *online* modality from available technologies of communicative mediation, which represents an essential indicator of the availability of digital platforms to meet similar proposals. Its implementation in these molds expands the scope of the fair, making it more accessible in its extensionist character.

Instagram is a widely known social network whose main feature is sharing images and videos. The choice of Instagram as an environment for the exhibition of the expo had its widespread use by academics and the ease of dissemination of content.

The works presented at the Expo find the possibility of socioeconomic increment from the performance of Furb's Agit, which seeks to safeguard the intellectual property rights of all those involved with the projects and collaborate with them on their transfer to the market. The Agit has already submitted three patent applications to the National Institute of Industrial Property (Inpi) originating from the Fairs. As a technological showcase, the expo allows for projects to participate in other events and awards of the innovation ecosystem at regional and state levels.

DISCUSSION

All organizational strategies can and should be analyzed and adapted in each context, including crises, as is the case of the Covid-19 pandemic. Thus, according to Autio et al. (2021), the use of digital technologies to realize innovation and entrepreneurship fairs, previously face-to-face, confirms the resilience of organizations.

In the case of educational strategies proposed within the framework of pedagogical plans, the reality is no different. Therefore, the opportunities and challenges for universities in the creation and extension of knowledge placing HEIs in a difficult task to adapt to the future of education and, at the same time, still be able to play a crucial role in leadership and transformation of society, with adaptation to the new realities of social and technological interactions. This is what is inferred from the need for universities to figure as active instances in technological extencionism (OECD, 2018).

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It is possible to state that the curricular transformations that operated within the CCT at Furb were primarily due to the influence of assumptions related to entrepreneurial culture and Innovation.

The triple helix model described by Etzkowitz and Zhou (2017) points to the need for transformations in the academic environment and its respective curricular structure. The practical and integrated realization of teaching, research, and extension (Resolução nº 7 MEC/CNE/CES, 2018) require that the academic environment's traditional spaces become densely permeable to practices and dialogues with society. This means that the entrepreneurial culture at the university must find conditions for students to transform their ideas into concrete solutions.

The Innovation Factory acts as a concrete space for entrepreneurial propositions by the university (Rideout & Gray, 2013), contributing to the improvement of the innovation ecosystem.

Technological mediation of communicative processes structurally integrates everyday reality. Countless activities are dependent on telecommunication infrastructures. In addition, the conditions imposed by the pandemic demanded rapid changes in different areas. Digital media have become crucial to the universities' teaching, research, and extension pillars.

Based on the work of Mahraz et al. (2019), the experience of digital fairs reveals opportunities at three levels: in the experience of the collectivity that honors and nurtures its reality with the projects exhibited; in the transformation of the processes involving higher education; in the reinvention of teaching-learning models.

Learning through ICT is being implemented and improved with daily adaptations. Likewise, fairs, seminars, and congresses have been integrating themselves into this reality, transforming a social deficit into an excellent opportunity to develop new forms of approach and new possibilities for engaging teaching.

The Innovation and Entrepreneurship Expo of the CCT-Furb is an example of this reality. Held remotely and with well-known digital platforms, the expo fulfills the role of stimulating interest in developing science, technology, and innovation among students of the CCT courses, administrative technicians, university professors, and the community in general.

The exhibition of the results of the projects developed in the classroom, now in a virtual environment, provides an even more extensive network of views and interactions. The digital network exhibition and exchange potentially reach an even larger audience, stimulating innovation and entrepreneurship and fostering approximations that may result in different spaces for discussion and improvement.

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Concerning the material presented by the exhibitors, it was observed that most of the winners of the digital editions had participations in their images in their videos, to the detriment of other works that only contained images and narrative. This may demonstrate the humanization of digitalization, where it is postulated that the goal is to identify points of the human-technology relationship, increasing the interaction and improving the user experience.

The circular dynamics present in the digital paradigm, referred to by Castells (2010), enables the improvement of human communication, by integrating various languages and symbols. In this framework, the visualization of the subjects involved in the process, allowing their identification and the perception of their personalities and communicative potentialities, is fundamental.

All individuals and companies need to choose which technologies suit the previously passed objectives. In the case of social media, these are popular, easily applicable, and accessible and can translate what is imagined utilizing graphics and sounds, provide suggestions, and *feedback* between different actors, in ways of double action between teachers, students, companies, universities, and society.

The new ways of working combined with new possibilities of a business offer through digital transformation allows streamlining processes and reducing manual steps, disseminating new forms of disclosure, facilitating analysis, sharing, organization and storage of files, and decision making.

One of the aspects demonstrated in the research was the possibility of integration with tools that the actors already know, providing opportunities for non-isolated, low-cost, and widely available solutions.

Social networks facilitate the rapid involvement of participants, and a more effective dissemination and greater participation of other actors, given that the contents displayed remain available to the public on the platforms after the fair.

The digital expo also motivates participants to devote more time and effort to preparing their projects since time is limited and exposure is more significant. The use of film editing software, scenario preparation, and scripts result in more elaborate and consistent presentations.

A direct consequence of digital fairs refers to the relationship with the external academic environment. The involvement of business sector representatives in the evaluation committees enables a greater contact of students with the market, increasing the chances of turning ideas into business, as addressed in Rideout and Gray (2013). A greater audience of

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entrepreneurs and market representatives was observed in the digital edition, leading to greater interaction of students with this sector.

More significant interaction and strengthening of networks were noticed when the actors were located closely and had the same objectives (Cardoso, 2012). In this case, the works published within the scope of the CCT have proximity, even physical, toa technology-based incubator and with the Innovation Center of Blumenau, facilitating access to funding edicts for innovation, mentoring in pre-incubation processes, and more broadly, the effective participation in the innovation ecosystem.

As a result of its potential for exposure, making technology in digital format enables more students to develop an interest in undertaking their ideas and projects.

PRACTICAL IMPLICATIONS

The present research results enable the improvement of planning and execution of university technological fairs using digital platforms. It should also be noted that the experience of the Innovation Expo at Furb served as a basis for the realization of other events of the university in digital media.

Certain aspects of contemporary life cannot be ignored, such as the presence of technology in all professional activities. The Covid-19 pandemic has further highlighted this presence.

This study offers elements for the organization and evolution of trade fairs in digital and hybrid formats. The discussion presented was how researchers sought to externalize methods and solutions involved in the organization of technological fairs in digital format, which can be integrated and improved considering the reality of all who intend to apply it.

LIMITATIONS AND FUTURE STUDIES

The research presents a limitation through the absence of quantitative and qualitative data related to *feedback* from the different participants of the fair. Thus, future research could be conducted during and after the online event by implementing procedures to obtain *feedback from* participants to the extent that the data treatment of this collection may contribute to the direct and indirect improvement of digital fairs.

Integrating people, technology, and new ways of working can also be discussed in terms of ethical and legal challenges. In the context of technology

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fairs held through digital platforms, future research can explore issues of image rights, and the limits of reproduction of concepts already previously known and protected by other organizations.

Future studies may explore the characteristics and the production model of the materials presented (banners, videos, etc.) by the exhibitors, enabling the identification of factors to be considered to improving the project's communication quality. The visual content design can be enhanced from observations that employ parameters related to User Experience (UX).

The paradoxes arising from the confrontation between face-to-face and virtual, especially concerning the economic and cultural factors that guide public choices, require further investigation of the future effects on teaching, research, and innovation.

Digital fairs find in the interaction processes important restrictive aspects. Thus, research that points to articulation strategies between the members of teams participating in the expo reveals the importance of providing the evolution of a communicative environment favorable to interactions that contribute to the improvement of the technologies exhibited.

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