INNOVATIVE TECHNOLOGICAL TOOLS FOR TEACHING SITUATED ENTREPRENEURSHIP: A CASE STUDY IN A HIGHER EDUCATION

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ABSTRACT

Purpose: To present, through a case study, two technological tools for the playful-business teaching of entrepreneurship, one called the digital channel "cvivo.digital," and another of a curricular type called "Didactic Contents for Entrepreneurship."

Theoretical Framework: The Communication Revolution poses a challenge to one of the oldest and most persistent problems in the world, and technological tools represent determining factors in entrepreneurship processes (González et al., 2020).

Design/Methodology/Approach: As a methodological strategy, the phases of conceiving, designing, implementing, and operating (CDIO) were implemented. Although originally a teaching strategy in engineering, it is also applicable to research processes in other fields of knowledge. The stated stages were accompanied by documentary reviews, exercises of participant observation, and pilot testing, leading to the materialization of the technological tools.

Findings: The results highlighted the joint management and circulation of knowledge (students-teachers), functionality, usability, and portability of technological tools according to the real context of students and the current and growing challenges of entrepreneurship in Colombia.

Research, Practical & Social Implications: The article shows a path to promote and strengthen entrepreneurship in higher education by offering the pillars that can contribute to this important task for society.

Originality/Value: The results reflect an innovative way of addressing formative needs and promoting innovation, inviting reflection and experimentation with these forms of university work in various contexts.

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FERRAMENTAS TECNOLÓGICAS INOVADORAS PARA O ENSINO DO EMPREENDEDORISMO SITUADO: UM ESTUDO DE CASO EM UMA INSTITUIÇÃO DE ENSINO SUPERIOR

RESUMO

Objetivo: Apresentar, por meio de um estudo de caso, duas ferramentas tecnológicas para o ensino lúdico-empresarial do empreendedorismo, uma chamada: canal digital "cvivo.digital" e outra do tipo curricular chamada "Conteúdos didáticos para o empreendedorismo".

Referencial Teórico: A Revolução da Comunicação se apresenta como um desafio diante de um dos problemas mais antigos e persistentes do mundo, e junto com as ferramentas tecnológicas, representa fatores determinantes nos processos empreendedores (González et al., 2020).

Desenho/Metodologia/Abordagem: Como estratégia metodológica, foram implementadas as fases de conceber, projetar, implementar e operar (CDIO), que, embora sejam uma estratégia de ensino em engenharia, também se aplicam a processos de pesquisa em outros campos do conhecimento. As etapas mencionadas foram acompanhadas

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by revisões documentais, exercícios de observação participante e realizações de testes piloto, o que levou à materialização das ferramentas tecnológicas.

**Resultados:** Como resultados, destacaram-se a gestão e circulação do conhecimento de forma conjunta (estudantes-docentes), funcionalidade, usabilidade e portabilidade das ferramentas tecnológicas de acordo com o contexto real dos estudantes e os desafios crescentes e atuais do empreendedorismo na Colômbia.

**Pesquisa, Implicações Práticas e Sociais:** O artigo mostra um caminho para promover e fortalecer o empreendedorismo no ensino superior, oferecendo os pilares que podem contribuir para essa importante tarefa para a sociedade.

**Originalidade/Valor:** Os resultados refletem uma maneira inovadora de atender às necessidades formativas e fomentar a inovação, convidando à reflexão e à experimentação dessas formas de trabalho universitário em diversos contextos.

**Palavras-chave:** Educação Gerencial, Educação Executiva, Análise Bibliométrica, Gestão e Educação Empresarial.

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**HERRAMIENTAS TECNOLÓGICAS DE INNOVACIÓN PARA LA ENSEÑANZA DE UN EMPRENDIMIENTO SITUADO: UN ESTUDIO DE CASO EN UNA INSTITUCIÓN DE EDUCACIÓN SUPERIOR**

**RESUMEN**

**Objetivo:** Presentar, a través de un estudio de caso, dos herramientas tecnológicas para la enseñanza del emprendimiento, una denominada: canal digital “cvivo.digital” y otra de tipo curricular denominada “Contenidos didácticos para el emprendimiento”.

**Marco Teórico:** La Revolución de la Comunicación se presenta como un reto ante uno de los problemas más antiguos y persistentes del mundo, y junto con las herramientas tecnológicas, representa factores determinantes en los procesos de emprendimiento (González et al., 2020).

**Diseño/Metodología/Enfoque:** Como estrategia metodológica se implementaron las fases concebir, diseñar, implementar y operar (CDIO), que si bien son una estrategia didáctica de la ingeniería, también son aplicables a procesos de investigación en otras áreas del conocimiento. Dichas fases fueron acompañadas de revisiones documentales, ejercicios de observación participante y realización de pruebas piloto, que condujeron a la materialización de las herramientas tecnológicas.

**Resultados:** Los resultados incluyeron la gestión y circulación conjunta del conocimiento (estudiantes-docentes), la funcionalidad, usabilidad y portabilidad de las herramientas tecnológicas de acuerdo con el contexto real de los estudiantes y los retos crecientes y actuales del emprendimiento en Colombia.

**Implicaciones Investigativas, Prácticas y Sociales:** El artículo muestra un camino para promover y fortalecer el emprendimiento en la educación superior, ofreciendo los pilares que pueden contribuir a esta importante tarea para la sociedad.

**Originalidad/Valor:** Los resultados reflejan una forma novedosa de atender las necesidades de formación y fomentar la innovación, invitando a la reflexión y experimentación de estas formas de trabajo universitario en diferentes contextos.

**Palabras clave:** Educación en Gestión, Educación Ejecutiva, Análisis Bibliométrico, Educación en Gestión y Negocios.

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**1 INTRODUCTION**

According to the most recent study by the Global Entrepreneurship Monitor (GEM), 68.7% of Colombians consider entrepreneurship as a desirable career choice. Additionally, Colombia stands out with the highest rates of potential entrepreneurs (57.5%) and people with the intention to start a business (50.2%) compared to the average, ranking second in Latin America after Chile (GEM Report, 2019). This acceleration of entrepreneurship and virtual
education in Colombia and Latin America has become a challenge for higher education institutions (HEIs), as it is essential to adapt to the new work ecosystems and digital transformation demanded by the current reality.

Therefore, HEIs focusing on entrepreneurship education should consider incorporating technological tools into their teaching and learning processes to stay abreast of technological and communicative trends that have gradually migrated to the educational field (Grajales et al., 2021). Although technological tools are sets of programs, resources, and computer tools that allow for dynamic and interactive content creation, as well as the storage, sharing, and exchange of information and knowledge, their utility is not limited to a single field. Currently, they play a fundamental role in areas such as sports, medicine, and industry due to their versatility (Molinero et al., 2019).

To illustrate the impact of technological tools on entrepreneurship, successful experiences can be highlighted, such as the ME-310 Method developed by the Stanford University Design Research Center in California. This method is based on a training platform that encourages the development of physical and engineering innovations to address real challenges in the industry. Students and teachers take on real-world design challenges presented by corporate partners, such as Nokia, the world's largest mobile phone manufacturer. A successful example was the creation of "Ki'i 2007," a handheld device that allowed users to create and access expressive drawings and comments (ME310, 2021). This experience facilitated interdisciplinary collaboration between students, teachers, and industry to provide innovative solutions to real market needs (Clarke, 2020).

In Colombia, the Retev project (Virtual Technological Entrepreneurship Network), promoted by COLCIENCIAS, the entity responsible for promoting public policies to foster science, technology, and innovation in Colombia, seeks to establish a national network to strengthen entrepreneurship capabilities and create virtual communities of entrepreneurs through a web platform and a virtual campus. These act as cooperative work links and offer courses and seminars for the formation of entrepreneur networks, supported by virtual and in-person tutors (COLCIENCIAS, 2018). Furthermore, the "Game to Be an Entrepreneur and Become an Entrepreneur," based on the Entrepreneurship to Learn method, is implemented by the Entrepreneurship Club in public and private schools in Colombia. This game simulates entrepreneurial life and allows participants to develop entrepreneurial skills, attitudes, and values in a business environment (Martínez et al., 2011).
These experiences, along with the contributions of technological foresight, which analyzes current needs to develop new technologies and gain competitive advantages in educational, industrial, economic, and social processes (Flores et al., 2021), promote experiential development in the training of entrepreneurs and future business Leaders. In this context, CUN faces the challenge of becoming an innovative institution in entrepreneurship education. For this reason, two technological tools developed by the CUN Innovation Department and used by area teachers are presented: "cvivo.digital" and "Didactic Contents for Entrepreneurship." These tools aim not only to transmit knowledge but also to generate meaningful and engaging experiences for students through creative and innovative digital content with updated information on entrepreneurship, as well as real-time communication with entrepreneurs.

As a methodological strategy, the "CDIO" phase (Conceive, Design, Implement, and Operate), originating in engineering education but becoming an important reference for creating, reforming, or transforming curricula in any academic program, is implemented. It provides students and teachers with the necessary tools to address societal problems innovatively and flexibly (Arias et al., 2016). This article describes the development of this methodology, which included documentary reviews, participant observation, and pilot tests, to identify critical aspects in the teaching and learning of entrepreneurship at CUN and guide towards a more entrepreneurial education.

In summary, this document initially addresses a theoretical framework reflecting on the evolution of communication, technological tools for virtual education, academic challenges, and educational innovation in the technological era. Then, the implemented methodological route is presented, and finally, the main results, discussions, achievements, and lessons derived from the study are exposed.

2 REVIEW LITERATURE

2.1 COMMUNICATION AND ITS R- EVOLUTION

The evolution of humanity has been influenced by specific factors of change, among which the technical and cultural uses of communication stand out (Martin, 2007). Communication processes in society depend on various components: the characteristics of the sender, those of the receiver, both in the context of the process, and the technology used in
communication, i.e., the material process through which signals are produced, transmitted, received, and interpreted (Arsenault et al., 2008). In essence, communication has been composed and retains the same scheme of elements to this day. It dates back to the use of non-verbal signals that allowed the understanding of the intentions of another human being. These signals evolved into a structure of "proto-language" or basic language that depended on signs and symbols but eventually evolved into an articulated language with grammar and syntax, giving rise to writing.

Cultures are constituted by communication processes, and all forms of communication are based on the production and consumption of signs (Castells, 1996). For others, communication is based on the exchange of signs in a dynamic process that involves reciprocity operating according to the structure and movement of society (Baudrillard, 1972/2005).

Communication has evolved and improved its channels according to the needs and dynamics of communities. From the use of signs and symbols to the use of animals as messenger pigeons, it progressed to writing, text reproduction machines, and then to remote communication devices such as the telephone, radio, television, computers, mobile phones, and in the 1960s, the internet with its digital revolution. The internet marked a new milestone in the history of communication by becoming a transmitter of vast sources of information and simultaneously an open and simultaneous communication channel, transforming the traditional model of communication into an interactive and dynamic process.

The internet, also known as the "World Wide Web," with the creation of new channels such as websites, wikis, blogs, email, and social networks, has established a new culture of communication and interaction among people. In this virtual environment, spaces for expression, publication, and sharing of feelings, thoughts, and opinions on specific topics have been created (Cerf, 1996).

This "communication culture" has given rise to the generation of new avenues and alternative methods for interaction, teaching, and learning, including meeting platforms and virtual reality, as well as numerous tools for creating and visualizing content. New forms of communication have mediated and disseminated culture, profoundly transforming cultures and will continue to do so over time due to the new technological system (Castells, 1996).

The Communication Revolution presents itself as a challenge to one of the oldest and most persistent problems in the world: how to stay united and connected considering technological advances and the social, political, cultural, and economic rhythms that society demands every day.
2.2 TECHNOLOGICAL TOOLS FOR VIRTUAL EDUCATION

Virtual education comprises a set of pedagogical knowledge and competencies mediated by the development and application of technological tools, which stand out for their mass reach and versatility. In the current educational landscape, strongly influenced by constant technological advances, virtual training becomes increasingly necessary and indispensable, particularly in technical and professional fields (González et al., 2020).

According to Torres et al. (2019), virtual education brings with it technological tools that, when incorporated into the educational system, allow overcoming temporal and geographical barriers. These tools promote self-learning and establish new training modalities that better suit the demands of interactivity and interconnectivity in society.

In this context, the introduction of so-called digital technologies or technological innovation tools in various sectors of society, especially in education, represents a profound transformation of the objectives and methods of both organizational structures and teaching processes in higher education. Similar to how technology has impacted all aspects of society, it is also altering expectations about what students need to learn to function effectively in the new global economy (Zapata, 2015).

Regarding the variety of technological tools, Cabrera et al. (2019) argue that there is a wide diversity of these tools, as can be seen in the Figure 1 below.

**Figure 1**

*Types of technological tools*

<table>
<thead>
<tr>
<th>Type of tool</th>
<th>Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Text creators and processors</td>
<td>Allow users to create, edit, and modify texts in the format they establish. Example: Microsoft Windows Word.</td>
</tr>
<tr>
<td>Creators of multimedia presentations</td>
<td>Used to combine texts and multimedia content in the same file, such as Microsoft Windows PowerPoint.</td>
</tr>
<tr>
<td>Graphic design</td>
<td>Software aimed at designing cards, bulletins, brochures, among other images that can have different uses. The most popular is Publisher.</td>
</tr>
<tr>
<td>Photographic design</td>
<td>A tool used to enhance the appearance of a photograph and make it look more professional. Example: Photoshop.</td>
</tr>
<tr>
<td>Generic social networks</td>
<td>Applications designed to share with other users without a specific defined theme, but users decide what topics to address. The most popular ones are Facebook, Twitter, Instagram, and now TikTok.</td>
</tr>
<tr>
<td>Specialized social networks</td>
<td>Applications that, upon creation, already have a predefined theme. Content can be uploaded in various formats, although they don't offer much</td>
</tr>
</tbody>
</table>
A prominent example of how these technological tools can function in an integrated manner is the GEN10S project, an educational innovation initiative developed by the NGO "Ayuda en Acción" in collaboration with Google.org. This project aims to bring the world of science and technology to children and adolescents on an equal footing and for free. Its purpose is to provide young people with technological skills, encourage STEM (science and technology) vocations, and, at the same time, promote values and entrepreneurial spirit. All of this is achieved through the use of interactive platforms, videos, games, and social networks, among other resources (Colombia Aprende, 2021).

These and many other technological tools are contributing to transforming not only the dynamics in traditional and virtual education but also the processes of management, production, and operation in industry and commerce. Therefore, Higher Education Institutions (HEIs) must be at the forefront of adopting these technologies.

2.3 CHALLENGES OF ACADEMIA AND EDUCATIONAL INNOVATION IN THE TECHNOLOGICAL ERA

One of the most significant challenges facing educational institutions in the technological era is the creation of strategies that drive the development and transformation of society through the empowerment of human capabilities. Educational technology, as a pedagogical discipline, is responsible for conceiving, applying, and systematically evaluating teaching and learning processes using various means to achieve educational objectives (Sancho et al., 2015). Therefore, according to the Colombian Association of Engineering Faculties – ACOFI (2020), universities must face several important challenges:

- Adapt to curricular flexibility and demonstrate the ability to innovate and lead since 21st-century professionals must be creative, entrepreneurial, competent in information and communication technologies (ICT), and able to adapt quickly to changes.
- Identify and understand the "new reality" characterized by the economy, quick adaptation to circumstances, and the central role of technology, requiring changes or adaptations to face-to-face approaches.

Note: Self-created based on Cabrera et al., (2019)
• Promote the creation of collaborative networks that foster a strong educational community, using ICT for pedagogy and curriculum.
• Become transformative change agents by adopting new forms of management and dynamic educational processes that contribute to sustainable, social, and productive development.
• Place technology at the center of teaching and learning processes, with a focus beyond simple technological instrumentalism.

In this context, it is essential to rethink the role of academia in technical-professional training, considering digitization, globalization, and cultural diversity as influential factors. Academia must pursue goals that align with the type of individual they aim to shape and the prevailing social and cultural model (Torres et al., 2017).

Faced with these challenges, educational innovation has become a key strategy in Higher Education policies and university strategies. Although numerous products, technologies, and methodologies have been developed that have promoted changes in education, there are still challenges and needs identified in the training processes of students and university professors (Macanchi et al., 2020). Educational innovation is not a one-time activity but a continuous process that involves observing classroom practices, organizing educational institutions, the dynamics of the educational community, and the professional culture of the teaching staff (Cañal de León, 2002).

Among the efforts to innovate in education are flexible, creative, and participatory curricular transformations, the development of competencies such as innovative thinking, entrepreneurial thinking, and socio-emotional skills, and didactic strategies such as Project-Based Learning (PBL) to encourage research as a fundamental part of the training of both students and teachers. In addition, software, games, tutorials, and interactive platforms are used to facilitate understanding of content and the exchange of knowledge (Martínez et al., 2021).

2.4 WHY IS IT IMPORTANT TO TALK ABOUT SITUATED ENTREPRENEURSHIP AT CUN?

As mentioned, one of the current goals of CUN is to provide entrepreneurship training to its more than 7000 students. To achieve this, the institution has been evaluating and reflecting on the relevance of contextualized entrepreneurship education. This approach allows students and teachers to acquire the ability to understand and address the complex realities of their
operating environment and, based on that understanding, propose practical and sustainable solutions. How can this be achieved? CUN believes that, through a thorough analysis of reality and the implementation of educational innovations in the classroom, as well as promoting study plans and pedagogical strategies that encourage the use of innovative technological tools, such as the development of applications and digital content, more enriching experiences in entrepreneurial education can be created.

It is crucial to highlight that entrepreneurship, among other aspects, plays an essential role in economic development, social and structural change, and is also considered a driving force for knowledge acquisition, technological change, competitiveness, and innovation (Herruzo et al., 2019).

In Colombia, according to Law 1014 of 2006, entrepreneurship is defined as a mentality, an approach, and an action focused on opportunities, with a global vision and balanced leadership, carried out by managing calculated risks to create value that benefits the company, the economy, and society.

Other sources indicate that entrepreneurship involves generating new opportunities through the introduction of new products or the improvement of existing processes. This is achieved through the ability to solve problems and make decisions and is characterized by creativity, boldness, and the ability for continuous adaptation, leading to sustainable success and leadership (Herrera et al., 2013).

Despite the variety of entrepreneurship definitions, it is important to note that this concept has become a field of constant growth for governments and academic institutions. It contributes to economic growth, the revitalization of the socio-economic structure, the promotion of innovation, and job creation (Kantis et al., 2002).

In this context, over the past two years, CUN has been working on the creation of innovative teaching-learning approaches that adapt to the current realities and challenges of entrepreneurship in Colombia. This is achieved through the implementation of technological innovations aimed at students, communities, and organizations. For the institution, it is essential to propose and develop contextual teaching strategies in entrepreneurship that allow:

a) relation: learning in the context of life experiences or prior knowledge;
b) experimentation: focusing on learning through exploration, discovery, and invention;
c) application: understanding concepts in the context of practical implementation;
d) cooperation: learning by collaborating and sharing with others;
e) transfer: applying knowledge in different contexts or situations (Murcia, 2020).
Teaching situated entrepreneurship, aligned with the local reality, becomes essential to contribute to the economic, social, and political development of regions. Some approaches focus on teaching how people who create businesses think and act (Sarasvathy, 2001), while others promote broader aspects such as creativity (Kirzner, 1979), innovation (Schumpeter, 1912), the ability to learn from failures (Minniti et al., 2001), and the management of uncertainty. The important thing is that current educational processes are influenced by the technological era, and virtual education is no longer simply an attractive option but a constantly growing necessity. Therefore, educational institutions must focus on the development of digital pedagogical skills and tools for both students and teachers, aligning them with the growing entrepreneurial vision at the local and regional levels.

In this context, it is crucial to consider flexible educational models that can adapt to changes and new trends in employability and productivity that society demands. Professionals with soft skills are sought, having broad knowledge in their area of expertise, whether in industry, technology, society, or individual scope. These professionals must be able to apply their skills and knowledge in situated business strategies that motivate them to create and maintain high-impact ventures (Herruzo et al., 2019).

3 MATERIALS AND METHODS

This is a qualitative study with descriptive purposes, taking data interpretation as the basis to analyze and discover what can be learned about the relevant study area (Jackson et al., 2007). For its development, the CDIO methodology was implemented, which has become an important reference for the creation, reform, or transformation of curricula and pedagogical practices in Higher Education Institutions (HEIs).

This methodology consists of four phases: conceive, design, implement, and operate. The key components developed in each of these phases are described below:

Phase 1. Conceive: This phase had two moments. The first involved identifying the needs and gaps in the entrepreneurship field in the virtual modality. Professors in the area selected the subjects of Entrepreneurship I, II, and III for review because these subjects require a Business Plan as a degree option, where difficulties in understanding content and generating viable and sustainable ideas could be evident. The virtual modality was chosen because 80% of CUN students belong to 6 regions of the country: Caribbean, Santanderes, Oriente, Andina, Eje cafetero, and Sur, where these subjects are offered virtually.
The second moment involved a review and documentary analysis of the evolution of communication and social, technological, and pedagogical trends in higher education, among others. Various databases such as Springer Nature journals, Sage journals, dianlnet, and redalyc were consulted.

As a parallel exercise, teachers also reviewed and observed around 50 virtual classrooms and synchronous meetings conducted by entrepreneurship students through the Meet platform. The goal was to observe and identify if digital pedagogical contents and tools were being implemented in line with the students' skills, their social reality, and the current competencies demanded by entrepreneurship in Colombia.

Phase 2. Design: Based on the information gathered in the previous phase, this phase focuses on creating the design and proposing a solution. To promote student participation in synchronous classes and facilitate the ideation, understanding, and importance of a business plan in the entrepreneurship context in Colombia, experts from CUN's innovation department designed the tools called "Cvivo.digital" and "Didactic Contents for Entrepreneurship."

The aspects considered for the design of technological tools were:

- A focus group consisting of students, teachers, and experts from the areas of technology and entrepreneurship was conducted. It involved a process of discussion and reflection on technical characteristics (programming language, types of templates, interface, animations, etc.) and content (syllabus of each subject of Entrepreneurship I, II, and III, images, podcasts that the tools should have, among others).
- Analyzing the digital tools used by teachers to conduct their online classes.

Phase 3. Implement: This phase refers to the transformation of the design into the product. In this case, to test the potential and impact of the technological tools on the teaching of situated entrepreneurship, a pilot test of both tools was conducted in the virtual classrooms of three groups, each composed of thirty (30) students from the subjects: Entrepreneurship I, II, and III. The pilot test took place during an academic semester.

The variables considered for the pilot test were:

- Impact: Measuring the degree to which the tools used achieve efficient learning.
- Participation: Measuring interaction, teamwork with others to achieve objectives, real-time communication with entrepreneurs, and students' access to information.
- Contents: Digital graphics, creative, innovative, and engaging content with updated information on entrepreneurship focused on students.
- Functionality: Usability and portability of digital tools on the Moodle platform.
In the pilot test, a questionnaire in Google Forms was applied to evaluate both tools by students and teachers. The questionnaire was sent to three groups of students from the Entrepreneurship I, II, and III subjects, entrepreneurship teachers, and technology experts through a mass message on the Moodle virtual classroom and email.

Phase 4. Operate: This refers to the use of the implemented product or process to deliver the expected result. The pilot tests led to the systematic replication of the two technological tools in all virtual classrooms of entrepreneurship students and in some other faculties, such as fashion design and business administration.

4 RESULTS

According to the proposed phases in the methodology, the following results were obtained:

Phase 1. Conceive. The needs and gaps identified in the Entrepreneurship I, II, and III subjects in the virtual modality were:

- Difficulty translating business ideas onto paper
- Ideas that did not provide relevant answers to contextual needs
- High dropout rate in these subjects
- Weaknesses in presenting subject content in a creative manner
- Disconnection in the curriculum content of the subjects
- Low rate of successful projects

Regarding the review and observation of virtual classrooms, a low attendance and participation of students in synchronous sessions were identified. Additionally, students face significant difficulties in generating and expressing clear, creative, and innovative ideas related to business projects.

On the other hand, during the literature review, a close connection was identified and understood between the growth and trends of entrepreneurship in Colombia and the characteristics and obstacles related to entrepreneurship education in Higher Education Institutions (HEIs). This highlighted the relevance of promoting educational innovation that could rely on strategically creating technological tools capable of addressing the various challenges faced by HEIs while adapting to the changing rhythms and demands of society.

Phase 2. Design: During the focus group process, the following technical, pedagogical, and content characteristics of the proposed technological tools were identified:
As the first technological tool, the creation of a digital channel, called "Cvivo.digital," was determined because it was considered the most attractive platform for both students and teachers. This is due to the combination of audio and image elements being highly appealing and facilitating the rapid assimilation of content. "Cvivo.digital" operates through an over-the-top (OTT) platform, which distributes video and image bitstreams in HTML format over broadband networks. This allows the content to be available on any device with an internet connection.

Regarding content, it was agreed that the channel would have four main categories in its menu: "Design," "Management," "Produce," and "Entrepreneur." The "Design" category provides students with a variety of elements, such as the use of color, shape, scale, photography, and drawing, among others, to communicate the value of products and services, differentiate themselves, and promote industrial solutions in the market.

The "Management" category offers tools for business management and coordination, covering managerial skills, quality concepts, finance, competitiveness, and production. This guides students in planning, organizing, motivating, and controlling their ventures.

The "Produce" category focuses on the production of audiovisual content for online transmission. It offers didactic, creative, and original strategies to optimize the virality of content.

Finally, the "Entrepreneur" category includes several subcategories, such as "Project Your Company," "Transform with Your Ideas," "Develop Your Company," and "Boost Your Company." In these subcategories, tools are provided for the formulation of business plans.

Each channel includes "videotips," live conferences with entrepreneurs, and live classes with expert teachers who explain topics in a simple and practical way. In addition, students and teachers are given the opportunity to interact with experts through chat or call. These pedagogical tools integrated into a digital channel are designed to offer an enriching educational experience for both students and teachers.

**Figure 2**

*Digital Channel Cvivo*

Source: CUN, 2019
The second tool designed was the "Educational Contents for Entrepreneurship." According to the focus group, this curriculum proposal should be designed by experts in marketing, production, quality, economics, design, finance, and administration. Through graphic contents such as images, icons, maps, and infographics, among others, it allows teachers and students to comprehend complex information at a glance.

The tool consists of the following stages that the student must go through:

- "Ideation": Here, students start constructing the first part of a business plan, consisting of three thematic axes: identifying problems and needs, structuring the business idea, and building a physical prototype representing the concept of the idea.
- "Validation": This stage involves the economic analysis of the business idea, the marketing plan, and the technical study. At the end of this process, the creation of a functional prototype is carried out, attempting to simulate the functionality of the product or service.
- "Formulation": In this stage, the last two parts of the business plan for creating a company are developed, focusing on the strategic planning and financial planning axes, to establish the feasibility of the business idea proposed in step I.

Phase 3. Implement: In this phase, the results of the pilot test were as follows, see Figure 3.

**Figure 3**

**Pilot Test Results: Technological Innovation Tools**

<table>
<thead>
<tr>
<th>Evaluated Aspect: Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both tools enable students to develop digital skills, critical thinking, and collaborative work.</td>
</tr>
<tr>
<td>Students can access the digital tools from various devices such as smartphones, tablets, and PCs, providing flexibility and dynamism in entrepreneurship subjects.</td>
</tr>
<tr>
<td>Through the use of these tools, students can propose projects more aligned with the realities of the country.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Evaluated Aspect: Participation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cvivo.digital: Enables participation and interaction among teachers, students, and entrepreneurs, fostering debates and live chats with a capacity for 500 connected individuals simultaneously.</td>
</tr>
<tr>
<td>Didactic Contents: Facilitates collaborative work, as teachers and entrepreneurs have been co-creators of the contents.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Aspect Evaluated: Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cvivo.digital – Didactic Contents: Students can navigate in a multilinear form and interact with the content, where they can view, download, and save information as many times as necessary.</td>
</tr>
<tr>
<td>Cvivo.digital: Contents are presented dynamically, in a friendly and interactive manner, involving professors from different knowledge areas and entrepreneurs from various economic sectors, along with communication professionals who serve as presenters and animators. Additionally, the tool features the launch of miniseries showcasing success stories of entrepreneurs, with teachers participating as actors.</td>
</tr>
<tr>
<td>Didactic Contents: It adapts to any business idea that needs to be developed by the student, enhancing the understanding and importance of business plans in the field of entrepreneurship.</td>
</tr>
<tr>
<td>Cvivo.digital: It has the capacity to adapt to any learning purpose</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Aspect Evaluated: Functionality</th>
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</table>

• Cvivo.digital and Didactic Contents: have the ability to interact with Moodle.
• Security: both tools protect the contained information; upon access, it requires the user and login password.
• Scalability: they have the capacity to expand or modify their functionalities to enhance or personalize them.
• Availability: for access, an internet connection is required, and users must log in directly to the website: Cvivo.digital and Telecampus (virtual classrooms).

Aspect Evaluated: usability
• Interface design: The graphic presentation of both tools is creative. In the case of the channel, it is easy to navigate, intuitive, and user-friendly in locating its elements. It features a home menu that displays all categories, a search function, and a programming grid for live events.

Aspect Evaluated: portability
• Both technological tools can run on different operating systems such as Windows, Linux, Android, and Mac.
• They operate solely through the web and can be accessed from both PCs and mobile devices.

Source: Self-prepared

Phase 4. Operate: In this phase, the technological innovation tools were replicated in the virtual classrooms of the entrepreneurship area, resulting in an increase in student participation in virtual classrooms, as well as more contextualized, robust, and strengthened ideas in the presentation of business plans. Both Cvivo.digital channel and Didactic Contents for Entrepreneurship encouraged students to move from passive listening to active participation that fosters the identification of challenges or issues in the industry, generating solutions and focusing on creating value.

5 DISCUSSION

The model depicted in Figure 4 integrates the two tools of Cvivo.digital and Didactic Contents for Entrepreneurship as a teaching and learning method for entrepreneurship that not only situates it in real contexts but also focuses on developing entrepreneurial competencies in students:

Figure 4

Entrepreneurship Teaching and Learning Model

Source: Self-prepared
The model takes the form of a seed with the entrepreneurial student at its center, surrounded by three cycles referred to as "propaedeutic," corresponding to levels of technical, technological, and professional education. Around this center are the technological tools of pedagogical innovation, the "Digital Channel" named CVIVO and the "Didactic Contents." The expected outcome of the model is the germination of the seed, meaning that students achieve the competencies of being, knowing, and doing. "Through Leadership, Communication, Disruptive Innovation, and Competitiveness as cross-cutting competencies to improve entrepreneurial practices" (CUN, 2019).

The experience of the CVIVO Channel and the "Didactic Contents" tools practically demonstrates how a coordinated scheme of educational and social interests can impact entrepreneurial competencies. Refer to Figure 5 for insights into how staying informed about new pedagogical and labor trends creates a competitive advantage.

### Figure 5

**Entrepreneurial Competencies**

<table>
<thead>
<tr>
<th>Competencies of Knowledge</th>
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<tbody>
<tr>
<td>• It means mastering knowledge for understanding and autonomous performance, as well as for processing external information and the ability to construct knowledge.</td>
</tr>
<tr>
<td>• Has the ability to analyze and is knowledgeable about technological, productive, managerial, and normative advancements and processes in their global and local environment.</td>
</tr>
<tr>
<td>• Is familiar with accessing, using, and leveraging ICT</td>
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<table>
<thead>
<tr>
<th>Competencies of Doing</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Characterized by catalyzing changes, eliminating fears, challenging with something new, and undertaking commitments and goals.</td>
</tr>
<tr>
<td>• Demonstrates leadership skills to positively influence groups.</td>
</tr>
<tr>
<td>• Makes decisions based on data and facts.</td>
</tr>
<tr>
<td>• Masters communication and promotes collaborative work</td>
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</table>

<table>
<thead>
<tr>
<th>Being Competencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Takes responsibility for their feelings, thoughts, actions, and decisions, which implies assuming the consequences of their actions and being accountable for them without infringing on the rights and freedoms of others.</td>
</tr>
<tr>
<td>• Develops self-improvement and motivation for achievement.</td>
</tr>
<tr>
<td>• Possesses self-discipline, autonomy, and persistence.</td>
</tr>
<tr>
<td>• Has a sense of belonging and social responsibility.</td>
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</tbody>
</table>

Source: Ahumada, 2013

In this context, teaching situated entrepreneurship, meaning taking into account the social and economic realities of the country, has become a challenge for some higher education institutions that needs to be addressed from different perspectives and methodologies (Herruzo et al., 2019). Hence, the CDIO methodology proves to be an interesting approach as it aims at competency-based education where knowledge, being, and doing are harmoniously combined. This implies a significant shift for many universities where the focus was on knowledge,
information, and theory. While in CDIO, conceiving an idea and designing a solution are intertwined with implementation and operation, the underlying message is that theory should be integrated with practice in real-world scenarios. Therefore, many higher education institutions like CUN have had to restructure their curricula and pedagogical teaching-learning processes, leading to more flexible curricula, new practice and research settings, and better technical, technological, and didactic equipment.

In this sense, the relevance of situated entrepreneurship in virtual education and the challenges of academia in the technological era find an important correlation with the CDIO methodology. Although initially designed for engineering education, CDIO proves to be a clear and concrete methodological path for other areas of knowledge (Arias, J., Ramírez, MC, Duarte, DM et al., 2016). In the specific case of the entrepreneurship area at CUN, an interesting connection was established among students, teachers, and entrepreneurs, highlighting critical thinking, self-learning, and the construction of contextualized knowledge. This contributed to the theoretical-practical understanding of situated entrepreneurship and its influence on the current reality.

6 CONCLUSION

The presented technological innovation tools allow us to conclude that social dynamics, labor market trends, and the diverse learning styles of young students increasingly demand that higher education institutions (IES) make efforts to innovate their curricular structures. This involves proposing dynamic learning environments and technological tools that enhance, as in the case of CUN, the circulation of knowledge, active participation, creativity, entrepreneurial spirit, and entrepreneurial competencies in both students and teachers. Additionally, it is evident that the design and implementation of the "CVIVO Digital Channel" and the "Didactic Contents" require, from the perspective of the instructor, not only technical, conceptual, didactic, and pedagogical knowledge of tool usage but also a contemporary vision of entrepreneurship and a critical, reflective, and ongoing analysis of the curricular content being taught to ensure that it meets the real needs and skills of future professionals.

In this context, the approach of situated entrepreneurship at CUN has allowed both teachers and students to understand that various types of entrepreneurship or business ideas must be anchored in the reality of cultural, social, and economic contexts to achieve innovative and sustainable impacts on the real needs of communities. One potential limitation is the
importance of designing an evaluative tool that can capture the ongoing impacts of the two tools on students to assess their annual social relevance.

It is important to mention, as a lesson learned, that the development of technological tools for entrepreneurship training and support should not only be considered at the undergraduate level. At the postgraduate level, there is a high favorability for entrepreneurship and the establishment of consolidated businesses. As a future research challenge, it would be interesting to promote situated entrepreneurship based on a sustainable economic model, focusing on different digital platforms and tools.

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