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RESEARCH ARTICLE

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Learning Ecosystem: Designing an Inclusive Space to Enhance the Higher Education Process

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Abstract: This study investigates the integration of inclusive learning spaces in educational ecosystems, inspired by architect Rosan Bosch, to enhance entrepreneurship and inclusion in higher education. The concept of "ecosystem" is crucial in fostering environments where students, including those with disabilities, can thrive. Using the HomeByMe application, a design is proposed for implementing these spaces in educational institutions. Literature emphasizes the importance of involving diverse stakeholders and using ICT management to promote creativity, cooperation, and effective communication. In Ecuador, inclusion in higher education is a priority, driven by global and national organizations advocating for diversity. The research employs a qualitative approach, utilizing participant observation and interviews to explore learning ecologies and inclusion. Results demonstrate that learning ecosystems foster entrepreneurial skills such as problem-solving and critical thinking. The study recommends that higher education institutions integrate social dimensions into their policies, use technology for personalized learning, and encourage collaboration among diverse student groups. These efforts aim to create equitable educational opportunities, addressing socio-economic and cultural barriers while promoting an entrepreneurial mindset through interactive and challenging content.

Keywords: learning ecosystem, inclusive education, higher education, entrepreneurship

1. Introduction

In recent years, the concept of "ecosystem" has gained increasing prominence in social and educational research, particularly regarding entrepreneurial culture, local development, and competitiveness. Scholars aim to understand the role of individuals within organizations and as part of broader associations. Ecosystems, by nature, are interconnected: any change to one component inevitably impacts others. To thrive, ecosystems must balance adaptability to change with sufficient stability to maintain their core structure [1].

This study examines environments where teachers and students engage in substantive activities, such as mentoring, graduation interactions, and creative spaces that drive professional training while emphasizing inclusion and entrepreneurship. Without inclusive settings, integrating students with disabilities or learning disorders becomes a significant challenge. Inspired by architect Rosan Bosch's principles, this research utilizes tools like HomeByMe to design inclusive spaces tailored to the needs of educational institutions.

To frame its inquiry, the study is guided by the following research questions:

1) What are the anticipated benefits of implementing learning ecosystems in educational institutions?
2) How can learning ecosystems foster an entrepreneurial culture among students?
3) What guidelines can be developed to design inclusive learning ecosystems that address the diverse needs of students?

In the context of rapid ICT advancements, the digital ecosystem paradigm—widely embraced by universities—offers a comprehensive framework for managing information and technology integration. Understanding and applying this paradigm effectively is essential to achieving innovative and inclusive educational objectives [2].

By addressing these research questions, this study aims to demonstrate how inclusive and entrepreneurial ecosystems can transform educational institutions, ensuring accessibility, fostering innovation, and enhancing student learning outcomes.

2. Literature Review

According to Álvarez-Arregui and Arreguit [3], it is necessary in the academic context to analyze the directors of public educational institutions who are not considering that innovation is a continuous process requiring creativity to respond to problematic scenarios arising from the treatment of multidisciplinary projects based on knowledge. In these contexts, individuals and legal

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entities expand ideas, use tools, present models, and shape protocols. To facilitate these activities, it is essential to create ecological learning spaces, either physically or virtually, due to the series of resources and services required for their implementation.

In the case of countries like Spain, during the pandemic according to a study conducted in 2020 [4], the teaching staff is aware of the obstacles they have encountered in carrying out academic activities using technologies that, generally and until now, were not those they typically used for teaching. Added to this are other noteworthy aspects, such as the environment in which the activity had to take place: the home, which is not always suitable for it, and the well-known challenges of work-life balance, which fall outside the scope of this study. On the other side of the teaching activity is the student, whose circumstances have also been affected by the aforementioned situation. The usual working ecosystem, which took place across classrooms: laboratories, study rooms, and direct communication with professors and peers, has shifted to an environment with far fewer physical resources (equipment, bibliographic materials, work, and study spaces), posing new challenges in maintaining fluid and close contact with the other key participants in the personal learning process.

It is clear to start with reflections from authors the ability to navigate the benefits and risks of digital connectivity largely hinges on one key factor—digital literacy. Digital literacy is "the ability to access, manage, understand, integrate, communicate, evaluate, and create information safely and appropriately through digital technologies" [5]. Among the alternatives, it is interesting to allocate more time for reflection, learning by doing rather than just listening or reading, as the strengthening process occurs through practice. There is a need to carefully articulate students' cognitive inputs with suitable pedagogy.

According to regional studies in the Latin American context, the learning ecosystems are also characterized by their hybrid nature. As the concept of a digital learning ecosystem suggests, it relies on technologies for storing content and facilitating communication and collaboration, thus becoming independent of the physical space and time associated with traditional teaching and learning processes. This assumption makes these ecosystems ideal for modes of study such as distance education. However, there are instances when students are physically present in classrooms. In such cases, some scholars refer to the concept of a hybrid ecosystem. It is proposed that this consists of two components: a blend of defined physical spaces and digital environments that complement traditional teaching methods. These hybrid ecologies are based on the integration of fragmented interactions across both physical and virtual spaces. This hybrid approach is common in Cuban universities, where technological infrastructure supports and enhances in-person learning [6].

On the other hand, the interdependence of students in social presence implies that cooperative and collaborative efforts are based on communication relationships as the first process that demands interpersonal skills. For this reason, the learning space constitutes the fundamental part of the open and personal learning ecosystem, as it represents a common thread of asynchronous and synchronous communication for users, learners, and teachers, thereby strengthening the interdependent relationships of communication, contribution, and reciprocity inherent in teamwork [7].

2.1. Theoretical framework

2.1.1. Benefits of incorporating a learning ecosystem in educational centers

The importance and relevance of technology today are undeniable, especially in the academic field. In educational terms, ecosystems can be characterized as posing challenges to the learning process since they require innovations that focus on personalized learning, diversifying practices, and offering resources based on the needs and interests of individuals [8]. Therefore, a critical element for the efficient design of an ecosystem is the participation of all involved stakeholders, including teachers, authorities, administrative personnel, students, families, and also technology providers and administrators [9].

On the other hand, according to del Valle Díaz et al. [10], this means that the purposes, means, and resources, both human and material, are established, distributed, and normalized in a specific and complete process that allows the total realization of the individual in society. This process encompasses creativity, cognition, learning styles, emotions, cooperative work, and reflection on actions and practices. Educational institutions are often heavily influenced by architectural elements, which can be contradictory to educational goals. Construction should align with pedagogical changes and contemporary needs, as well as the equipment that complements these spaces. When we think of educational spaces, we often imagine strictly defined classrooms, rows of seats oriented in the same direction, corridors as residual spaces for mere circulation, and, in some cases, flexible classrooms designed to accommodate different situations, among other things [11].

It is also stated that ecosystems are technological and position themselves as the advancement or future of conventional information systems, with two key components to emphasize. Essential factors for implementing innovations in the use of the Web 2.0 social ecosystem, through which transformations in teaching and learning processes are sought, which could be reflected in the organization through strategic plans [12].

2.1.2. Design of learning ecosystems for entrepreneurs in educational institutions

Designing learning ecosystems in educational institutions requires integrating 3D modeling tools to create customized entrepreneurial spaces for students. Trends in Education 4.0, such as e-learning and u-learning, have highlighted the need for digital skills, transforming virtual learning approaches during the pandemic [13].

Effective entrepreneurial ecosystems rely on six strategies: student-centered learning, teacher collaboration, positive climates, technology integration, flexible paths, and global alignment. These foster practical, lasting learning but remain underutilized in formal education systems [14].

Despite technological advances, higher education struggles to maximize these tools due to challenges in reimagining learning scenarios. Universities, aligned with the 2030 Agenda and SDG 4, must embrace inclusive networks to address global challenges and promote equitable, sustainable development [15, 16].

2.1.3. Inclusion in higher education

It is necessary to note that regulations conceived globally by organizations such as the United Nations Educational, Scientific and Cultural Organization, Regional Office of Education for Latin America and the Caribbean, Ibero-American States Organization, and others at the national level such as the National Secretariat for Higher Education, Science, Technology and Innovation, National Secretariat for Planning and Development, Higher Education Council, National Council for Equality of Disabilities, seek to promote respect for diversity as a fundamental value of society. This indicates that the only way to innovate the educational system is through the collaboration of teachers, students, authorities, and families [17].

In the Ecuadorian context regarding inclusion, studies like that of Bartolomé et al. [18] assert that within university educational institutions, numerous alternatives and initiatives have been implemented, opening up opportunities for thousands of young people to access higher education. This includes not only those with special educational needs but also members of different sensitive or historically marginalized groups. For this reason, changing this reality in terms of educational inclusion is a priority for entities associated with higher education. In this context, diversity has been assumed as a transcendent value, reinforcing options that institutions face in their efforts to create conditions that allow everyone to exercise their right to education with equality and also recognize their differences [19].

Similarly, the origins that can generate social exclusion in one or several groups in a community are diverse and usually involve conditions of inequality and vulnerability that have not been properly addressed over time. Another circumstance or reality that must be identified is economic crises, which are directly related to social and educational indicators, making more people susceptible to exclusion, especially individuals with different disabilities. However, the state is obligated to promote and create learning spaces to integrate everyone, as the Constitution of Ecuador in Article 27 describes that education must be centered on the human being and ensure holistic development, within the framework of respect for human rights, a sustainable environment, and democracy; it will be participatory, mandatory, intercultural, democratic, inclusive, and diverse.

In this way, higher education has experienced significant growth due to the participation of different social actors and pressure from groups belonging to civil society, historically excluded for a long time. Therefore, it is perceived that the university is no longer a scenario only for the social elite as in the 1950s but rather a complex and progressively diverse environment that comes culturally and socially from various sectors. The first goal is to seek equality of conditions, and the second is to break down economic and social barriers [20]. Certainly, higher education is a means to achieve sustainable development; higher institutions are sources of knowledge where ideas are linked, theories are tested, societal challenges are undertaken, and new technologies are promoted. Assertive changes resulting from the implementation of such demands and contributions to science that originate within its walls are manifested at all levels and areas, especially in education, in any nation that considers it necessary [21].

However, public perception in Latin America emphasizes the recognition of diversity, differences, and multiculturalism, often remaining only in universal and abstract notions. Although experience shows that it is possible to find agreement on events and inclusion guidelines put into practice, yielding authentic results among commonly excluded groups such as women, Afro-descendants, and indigenous people [22]. In this way, it is no longer sufficient to improve access alone; there arises the need for institutions to enhance their response to diversity in a broader sense. The concept has evolved to consider not only groups at risk of exclusion or marginalization but all students, their progress, and completion. Currently, inclusion is also considered the process that includes inclusive pedagogical practices to provide appropriate and efficient learning, equalizing, and learning from differences [23].

3. Research Methodology

3.1. Research design

This qualitative study, conducted during the first semester of the 2023 academic year, focuses on higher education and the characteristics of educational research. It aims to provide an explicit description of learning ecologies, emphasizing inclusivity within educational spaces. The research follows an inductive approach, interpreting data through participant perspectives and contextual evidence. This flexible methodology seeks to understand the dynamic realities of teaching and learning practices within a digital ecosystem framework.

To enhance reproducibility, the study combines various qualitative techniques:

1) Participant Observations: These were structured to document teacher-student interactions in inclusive and entrepreneurial learning spaces. Observations focused on key elements such as mentoring activities, collaborative projects, and engagement with digital tools. Specific behaviors, interactions, and environmental factors were recorded to capture the dynamics of inclusivity and entrepreneurship in real time.
2) Field Observations: Conducted within classrooms and virtual environments, these observations identified how digital ecosystems influenced teaching strategies and student engagement. Themes included accessibility, integration of technology, and the practical application of entrepreneurial principles.
3) In-depth Interviews: Interviews were conducted with teachers and students to explore their experiences and perceptions. The main themes included:

    a. Challenges and opportunities in inclusive education.
    b. The role of digital tools in fostering entrepreneurial skills.
    c. Perceptions of learning ecologies as transformative spaces.

4) Supplementary Techniques: Data were triangulated with a systematic review of prior studies, exploring inclusive learning ecologies in Latin America and Europe. This theoretical review provided a comparative perspective, highlighting innovative practices from Germany, France, and Spain and their adaptation in local contexts.

Digital ecosystems have created a new social, economic, and cultural framework, driven by technological advancements and the widespread adoption of the Internet, which enables continuous interaction among users. These ecosystems are also present in educational contexts, supported by digital government policies designed to advance information and communication technologies [24].

By combining these methods, the research offers a comprehensive understanding of teacher training and the integration of technology into inclusive and entrepreneurial education. This methodology provides a foundation for developing generalizable insights applicable to diverse educational contexts.

3.2. Participants

The case study, as part of the interactive qualitative approach, is conducive to applying the study aimed at the beneficiaries of this proposal, involving higher-level students such as seventh and eighth graders in the academic period of 2023, totaling approximately 28 individuals distributed across three parallel sessions in both the daytime and nighttime sections. This includes all the teachers involved in the areas of Graduation, Community Engagement, and Research, which are the primary axes of the educational model at UTMACH. In this diversity of roles, the choice of medium or media ecosystem is crucial for supporting socialization in online education. It must consider the structuring of professor-student and student-student interactions (both synchronous and asynchronous) and facilitate the teacher's observation of group processes [25].

3.3. Instruments

The design was implemented on the Machala Campus, home to the Pedagogy of Experimental Sciences program, which operates in both daytime and nighttime sessions within the field of Higher Education. This environment provided an opportunity to observe interactions between professors, students, and the broader educational community in both internal and external spaces. These interactions were crucial for identifying needs and designing an inclusive learning ecosystem.

The research employed a combination of instruments to gather qualitative and quantitative data:

1) Participant observations
   The observations were structured using a predefined checklist focusing on specific themes:
   a. Academic interactions: Types of student-teacher engagements, including tutorials, thesis guidance, and collaborative research activities.
   b. Space utilization: How existing infrastructure, such as cubicles and "islands" between buildings, was being used for academic and informal interactions.
   c. Inclusivity: Identification of barriers faced by students with disabilities or learning disorders during these interactions.
   d. Observations were conducted during both daytime and nighttime sessions to capture variations in usage patterns. Detailed field notes documented these interactions, complemented by photographs to support spatial analysis.
2) Semi-structured interviews
   Interviews were conducted with key stakeholders, including professors, students, and administrative staff. The main themes explored included:
   a. Perceptions of the current infrastructure and its adequacy for academic needs.
   b. Suggestions for improvements in creating inclusive and ecological learning spaces.
   c. Challenges faced in fostering student-teacher and peer-to-peer interactions, particularly for students with specific needs.
   d. Interview guides included open-ended questions to allow participants to elaborate on their experiences and provide actionable insights.
3) Surveys
   a. Surveys were distributed to collect data on broader perceptions of the campus environment, focusing on comfort, accessibility, and the perceived impact of physical spaces on learning outcomes.
4) Environmental analysis
   a. The campus spaces were evaluated using HomeByMe to model potential designs for inclusive learning environments. Spatial dimensions, traffic flow, and natural elements were incorporated into the analysis to ensure the proposed ecosystem aligned with the ecological conception of learning.

By combining these instruments, the study ensured a comprehensive understanding of the current infrastructure and its limitations, providing a robust foundation for designing a more inclusive and effective learning ecosystem.

3.4. Data analysis

The analysis of the collected data followed a structured approach to ensure methodological rigor and provide actionable insights. A mixed-methods framework was employed, combining qualitative and quantitative data to explore the dynamics of inclusive learning ecosystems.

Qualitative data from participant observations, field observations, and semi-structured interviews were analyzed using thematic analysis. This process involved:

1) Data coding: Initial coding was performed to identify recurring patterns and themes related to inclusivity, entrepreneurial skills development, and the use of digital tools in learning spaces.
2) Categorization: Codes were grouped into categories reflecting key aspects of inclusive learning ecosystems, such as accessibility, collaboration, and creativity.
3) Theme identification: Themes were refined and validated by triangulating findings with existing literature and participant feedback.
4) The software IBM SPSS was used to manage and analyze qualitative data, ensuring a systematic and transparent process. This approach provided a rich understanding of the experiences and perceptions of stakeholders within the learning ecosystem.

Quantitative data collected through surveys and environmental analyses were analyzed using statistical methods to quantify perceptions and identify trends. Key steps included the following:

1) Descriptive statistics: Basic measures, such as frequencies and means, were calculated to summarize participants' responses about accessibility, motivation, and the effectiveness of digital tools.
2) Visualization: Tables were created to illustrate key findings and facilitate comparison of quantitative data with qualitative insights.

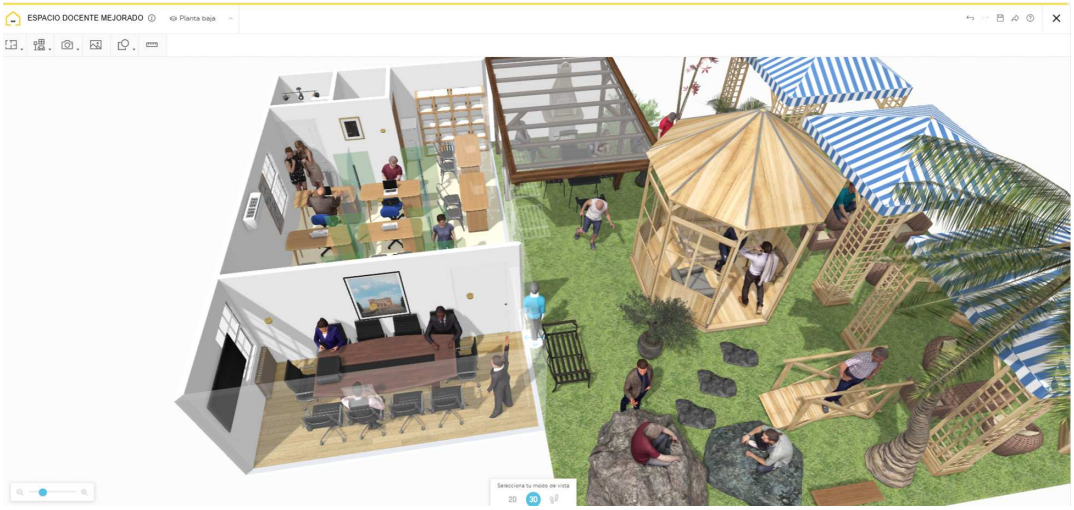
Data analysis provided a comprehensive perspective on the current state of learning ecosystems, highlighting strengths and areas for improvement. This methodological rigor ensures the study's findings are reproducible and transferable to other educational contexts.

4. Results

The design proposal for a student-oriented learning ecosystem for entrepreneurship generation was developed using the HomeByMe software, an online tool that enables two- and three-dimensional modeling. This software was instrumental in visualizing and designing spaces at real-world scales to ensure practical and accurate spatial planning. Figure 1 illustrates a comparison of the current cubicles used by teachers for student attention, highlighting their limited functionality and comfort. This visualization underscores the need for more inclusive and innovative environments.

This figure displays the existing infrastructure, which includes small, confined cubicles that do not adequately support dynamic or inclusive academic interactions. These spaces lack flexibility and ergonomic considerations, often leading to a less engaging experience for both students and teachers. For some authors like the German architect Rosan Bosch [26], drawing inspiration from Rosan Bosch's six types of educational spaces for the 21st century, the study envisions a transformation of these environments into an entrepreneurial learning ecosystem. Bosch's framework emphasizes

Figure 1
From cubicles for teachers' attention to students currently



spaces that support concentration, collaboration, creativity, and informal interactions, which are particularly valuable for fostering entrepreneurial competencies.

This diagram categorizes the proposed spaces into six types, each with distinct functionalities:

1) The mountain peak: A space for sharing ideas and knowledge with a group.
2) The cave: An area for individual reflection and concentration.
3) The campfire: A collaborative space for group discussions and teamwork.
4) The watering hole: An informal gathering spot to spark spontaneous interactions and inspiration.
5) Hands-on areas: Practical zones connecting theory with hands-on experimentation.
6) The movement space: A dynamic area encouraging physical activity to energize learning processes (see Figure 2).

Using HomeByMe, the study incorporates these elements into the campus environment. The designs emphasize flexibility and inclusivity, enabling students to interact in ways that stimulate creativity and entrepreneurship.

Figure 2
Learning spaces for the inclusive and entrepreneurial ecosystem

5. Discussion

5.1. Design of inclusive environments

These spaces align very well with the proposal of learning ecosystems for our academic institution. Using HomeByMe, a true-to-scale model of the teachers' offices, where they assist their students and its exterior was designed.

The different components of the software and the customization of the design, adapting the various spaces proposed by Bosch in her experience, allow for a comparison between the current and the new, incorporating the pedagogical, environmental, and digital dimensions with each element that enables and promotes an informal space for students to enhance ideas and entrepreneurship in higher education. Figure 3 presents a scaled 3D model of the reimagined teachers' offices and adjacent external areas. Key features include adaptable furniture, open layouts for collaboration, and natural elements to promote ecological harmony. The integration of digital tools further enhances the learning experience by bridging physical and virtual interactions.

These figures collectively highlight the contrast between the current infrastructure and the proposed design, illustrating how an inclusive ecosystem can transform the educational environment into a more engaging and supportive space for higher education.

Therefore, integrating different spaces into a single learning ecosystem allows students and teachers to enhance contributions for a healthy inclusive environment and also promotes entrepreneurship. A place should always be pleasant and provide benefits by combining social, technological, and academic aspects in line with the current times. See Table 1 for reference.

Interaction allows the generation and exchange of ideas. A pleasant environment is flexible, so it is crucial to have suitable spaces for all preferences, as this promotes learning and is an ally of entrepreneurship

The literature highlights diverse perspectives on the impact of virtual education for deaf students. Marschark and Spencer [27] emphasize that deaf learners can greatly benefit from virtual platforms when these are appropriately adapted to their needs. Their findings suggest that tools such as captions and real-time translation enhance comprehension and foster equitable interaction with hearing peers, promoting an inclusive learning environment.

Figure 3
Design of learning spaces for the inclusive ecosystem

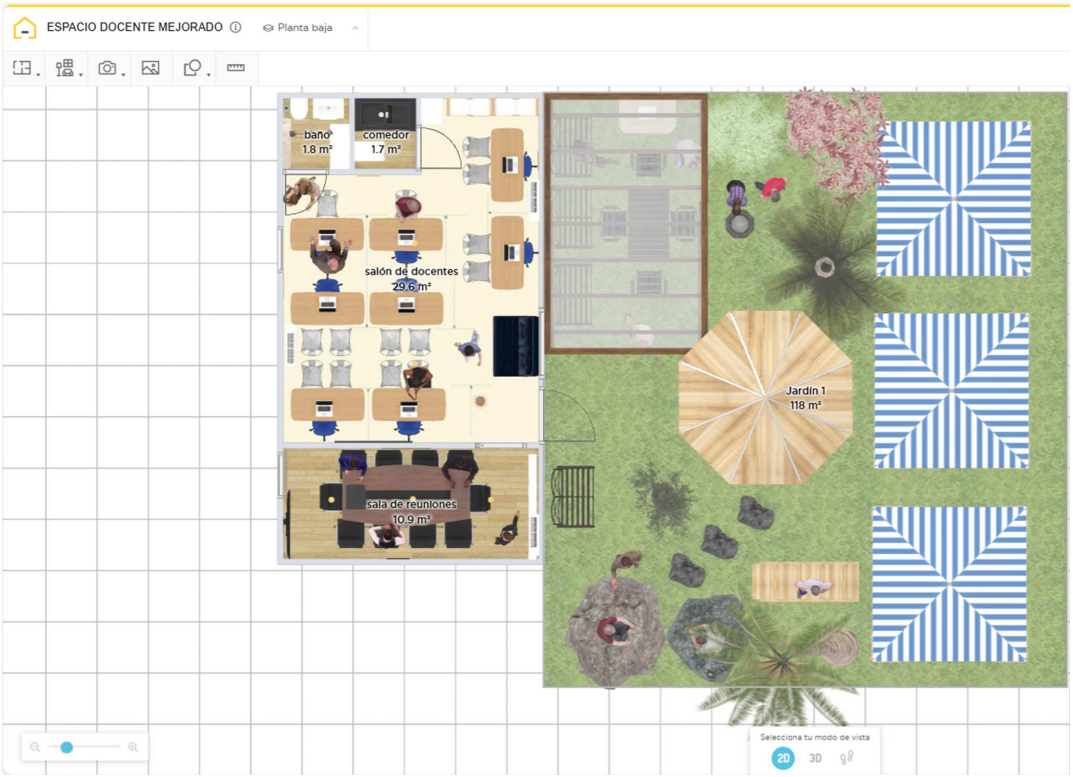
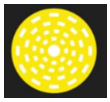


Table 1
Matrix of spaces for learning as an inclusive ecosystem

Symbology	Description
	The setting of the Mountain Top space establishes a place for an individual to address a group and share their ideas and perspective
	The setting of the Cave space provides a space for individual concentration and reflection. It is characterized by tranquility.
	The setting of the Circle space offers a venue for group situations. It empowers students to work effectively and focus on dialogue.
	The setting of the Spring makes the most of informal and circulation spaces. It is a space where interruption can take place, resulting in unexpected ideas.
	The Hands-On space is an essential design principle that adds a non-verbal dimension to learning.
	The design of the ¡Up! space integrates movement as a natural part of all spaces.

In contrast, Crume [28] points out that virtual education often fails to address accessibility adequately, leaving deaf students at a disadvantage. The lack of necessary adaptations, such as interpreters and tailored content, poses significant barriers to acquiring essential skills and knowledge, thus exacerbating the educational gap between deaf and hearing students.

Garberoglio et al. [29] offers a balanced view, highlighting both the potential and the challenges of virtual education for the deaf community. While these platforms can enhance flexibility and access to learning resources, their impact is limited by insufficient instructor training on adapting educational materials and existing technological constraints.

In Latin America, there is a notable gap in research specifically addressing the role of families in supporting deaf students within virtual educational settings. The reviewed studies predominantly focus on contexts in developed countries, revealing differing perspectives. Marschark and Spencer [27] underline the inclusivity and effectiveness of virtual education when adapted, whereas Crume [28] critiques its shortcomings in accessibility. Garberoglio et al. [29] adopt a middle ground, recognizing the dual nature of these platforms as both opportunities and challenges.

These findings underscore the importance of designing virtual platforms that cater to the specific needs of deaf learners. Adaptation is critical for ensuring inclusivity and maximizing the educational benefits of digital tools. Additionally, Skliar [30] advocates for an educational model that respects the sociolinguistic reality of deaf students. His proposal for bilingual education, centered on sign language as a primary mode of communication complemented by a second language, emphasizes the need to strengthen the personal and social identity of deaf students. This approach not only promotes inclusion within the educational context but also enhances their integration into cultural, informational, and professional spheres.

5.2. Design of inclusive environments analysis and interpretation of the aspects addressed

5.2.1. Motivation and emotional support

This study identifies that the family can play a crucial role in motivating deaf students to actively participate in training programs. This may include positive reminders, celebrating achievements, and reinforcing the value of continuous education. Additionally, emotions and personal experiences play a significant role in learning. Families can provide an emotionally supportive environment that encourages students to persevere through technical and linguistic challenges (see Table 2).

In Table 2, family participation in the virtual training of deaf students is fundamental. When adequately valued and applied, it can significantly influence students' motivation and success, as indicated by the average levels of importance in reinforcement and emotional support.

5.2.2. Facilitating access and technological support

Families can ensure that students have consistent and adequate access to technological devices necessary for training. Table 3 illustrates how families, in virtual settings, can provide basic technical support, such as initial device setup, troubleshooting internet connection issues, and managing software. It is worth highlighting that basic technical support and connection troubleshooting are also considered important, albeit with greater variability in perception. This may be due to the diversity in families' technical skills and the availability of technological resources.

The results in Table 3 highlight the aspects that most deaf students consider important. Among them, facilitating access and technological support stand out as essential elements for virtual education. Accessibility to devices and managing educational software are highly valued skills. Consequently, families play a crucial role in these areas. These findings suggest that any virtual education program for deaf students should incorporate a robust technological support component, with resources and training for both students and their families. Training in device and software usage, as well as accessible technical assistance, are key strategies to improve the educational experience.

5.2.3. Linguistic and cultural support

Families can help facilitate effective communication between the deaf student, interpreters, and university aides, ensuring that information is conveyed clearly and accurately. Recognizing and valuing the student's deaf identity and culture is crucial. Families can help reinforce an environment where the use of sign language and other aspects of deaf culture are appreciated and supported (see Table 4).

According to the results in Table 4, most participants consider linguistic and cultural support to be highly significant. Among the valued aspects, facilitating effective communication is rated highly important, with 18 out of 28 participants. Additionally, other aspects, such as supporting deaf culture, are also among the highest-rated indicators, with 17 participants highlighting its importance. This underscores a critical need for deaf students to have an environment that respects and values their linguistic and cultural identity, which remains largely unacknowledged by a significant portion of the population.

5.2.4. Support in time management and organization

Families can assist in managing the student's time by organizing schedules for training sessions, ensuring a suitable learning environment at home, and minimizing distractions (see Table 5).

Table 2
Motivation and emotional support

	Level of Importance					
Aspects to Consider	Very Low	Low	Neutral	High	Very High	Total
Positive Reminders	2	3	7	9	7	28
Celebrating Achievements	1	5	8	8	6	28
Reinforcing the Value of Education	0	2	7	10	9	28
Emotional Support Environment	0	3	6	10	9	28
Averages	0,75	3,25	7	9,25	7,75	

Table 3
Facilitating access and technological support

Aspects to Consider	Level of Importance					Total
	Very Low	Low	Neutral	High	Very High	
Facilitating Access to Devices	1	2	8	10	7	28
Basic Technical Support	0	3	7	11	7	28
Troubleshooting Connection Issues	1	3	9	9	6	28
Managing Educational Software	0	2	8	10	8	28
Averages	0,5	2,5	8	10	7	

Table 4
Linguistic and cultural support

Aspects to Consider	Level of Importance					Total
	Very Low	Low	Neutral	High	Very High	
Facilitating Effective Communication	1	2	7	10	8	28
Valuing Deaf Identity	1	2	8	9	8	28
Use of Sign Language	1	2	8	9	8	28
Supporting Deaf Culture	1	2	7	9	8	28
Averages	1	2	7,5	9,25	8,25	

Table 5
Time management and organization support

Aspects to Consider	Level of Importance					Total
	Very Low	Low	Neutral	High	Very High	
Time Management	1	2	8	9	8	28
Suitable Learning Environment	1	2	8	9	8	28
Minimizing Distractions	1	2	8	9	8	28
Task Supervision	1	2	8	9	8	28
Averages	1	2	8	9	8	

In Table 5, the information provided highlights the importance of family support in time management and organization. Most participants (over 60%) rate this aspect as highly important, emphasizing the need for a structured environment free from distractions to optimize learning.

5.2.5. Constructive feedback and positive reinforcement

Families can provide constructive feedback on the student's progress and support the implementation of recommendations from teachers and interpreters. Celebrating the student's achievements and progress positively reinforces their motivation and commitment to acquiring content and developing skills in digital competencies.

Table 6 examines aspects related to constructive feedback and positive reinforcement and identifies these as critical factors. Approximately 65% of participants rated these factors as highly important. This suggests that feedback and recognition of achievements play a significant role in the student's motivation and engagement, especially when families actively collaborate in their learning progress.

Table 6
Constructive feedback and positive reinforcement

Aspects to Consider	Level of Importance					Total
	Very Low	Low	Neutral	High	Very High	
Providing Feedback	1	2	8	9	8	28
Supporting Recommendations	1	1	7	11	8	28
Progress and Sequencing	0	2	9	9	8	28
Positive Reinforcement	0	1	9	9	8	28
Averages	0,5	1,5	8,25	9,5	8,25	

Table 7
Awareness and continuous education

	Level of Importance					
Aspects to Consider	Very Low	Low	Neutral	High	Very High	Total
Providing Educational Resources	0	1	6	12	9	28
Training in Assistive Technologies	0	1	7	11	9	28
Training in Learning Strategies	0	0	5	13	10	28
Raising Awareness about Deafness	0	1	6	12	9	28
Averages	0,5	0,75	6	12	9,25	

5.2.6. Awareness and continuous education

Providing families with educational resources about deafness, assistive technologies, and learning strategies for virtual environments can strengthen their ability to support the student effectively (see Table 7).

Finally, Table 7 emphasizes awareness and continuous education as an essential component for addressing the realities and needs of the deaf community, aiming to break down barriers, prejudices, and stereotypes about learning and facilitating knowledge. Approximately 60% of participants rated these factors as highly important. Training in assistive technologies and learning strategies is crucial for the effective inclusion of deaf students in virtual environments, alongside their families, who share a close bond with them and must also be considered.

The analysis of these factors reveals that all are perceived as critical to the success of virtual education for deaf students. Facilitating access and providing technological support, along with linguistic, cultural, and emotional assistance, are essential pillars. Families play a fundamental role in creating a supportive environment that fosters communication, organization, and motivation. To enhance the effectiveness of these educational programs, a comprehensive approach is required, including training for families and interpreters, as well as the implementation of appropriate.

6. Conclusion

Higher education institutions in Ecuador continue to promote, through a series of mechanisms, the access of youth from various segments of society to a spot, thus fulfilling the desire for professional education. However, when addressing the concept of creating spaces for inclusion from a broad perspective, numerous barriers are discovered in how Higher Education Institutions approach the issue. Specifically, educational inclusion needs assistance in creating inclusive instances in the student's curriculum and educational journey; otherwise, the inequality rate of the system increases. On the other hand, if we talk about entering the workforce for a student with limitations (lack of social capital, low cultural level, lack of networks), it is considerably challenging for the university itself to accompany them in this process; the only thing it can do is to follow up on its graduates.

So far, educational themes have been addressed, but the study's proposal asserts that an inclusive formative policy in higher education, and inadvertently at all levels, cannot be effective unless the social dimension is considered. Creating inclusive spaces, conceptualized as ecological learning environments, involves innovation by setting aside considerations such as socio-economic status, origin, beliefs, and the history of students. Simultaneously, university life itself encourages students to interact with diverse people and worldviews.

In higher education, the budget is subject to the demands of the executive branch, and projects must promote harmony that facilitates educational inclusion, allowing all components to converge. Resources should be allocated for a comprehensive approach to inclusion, which should be funded by public education policy.

The benefits of implementing learning ecosystems in educational institutions are numerous. The primary appreciation is to push semantic fields to name, understand, and deploy the inclusion category from the logic of belonging. Learning ecosystems promote the development of key skills for the 21st century, such as problem-solving, critical thinking, effective communication, and collaboration. These skills are essential in a constantly changing world, where adaptation and innovation are fundamental.

Learning ecosystems foster an entrepreneurial culture among students simply because having inclusive spaces generates the integration of interactive elements, educational challenges, and attractive virtual environments, thereby increasing student engagement. Higher-level students participate more actively in their learning processes by interacting with engaging and challenging content.

Appropriate guidelines for the design of learning ecosystems for inclusion in educational institutions serve as inspiration for the design of suitable ecosystems, especially the ability to adapt teaching and learning to individual student needs. Therefore, technological tools allow more precise monitoring of each student's progress, but the emotional aspect facilitates the identification of strengths and weaknesses. This translates into the possibility of providing specific resources and activities that promote more effective learning in spaces that demand universal social and public policies, fair cultural practices, and respect for diversities. In conclusion, the use of these tools will definitely contribute to the improvement of the development of meaningful learning in the current education context.

Recommendations

Higher education institutions actively integrate social dimensions into their inclusive policies, recognizing and addressing socio-economic and cultural barriers. Public policies should ensure adequate funding and resources for the development and implementation of inclusive learning ecosystems. Universities should leverage technological tools to personalize learning and provide targeted support, addressing both academic and emotional needs. Educational institutions should foster an entrepreneurial mindset by incorporating interactive and challenging content that motivates student engagement. The design of learning ecosystems should prioritize adaptability to individual needs and promote collaboration and communication among students from diverse backgrounds.

In light of the above, educators must seek out contextual case studies that address the realities of their communities, as individu-

als are social beings who study or train in a particular profession to serve and contribute to their communities. Therefore, educators should not operate in a virtual abstraction but in a contextualized manner. This is precisely what achieving knowledge ecology entails—having the expertise to contribute to holistic development within the ecosystem. Adapting to this has required additional effort, without certainty that the learning outcomes will align with the objectives outlined in the curriculum. Nevertheless, teachers, students, and even their families at all levels of education must learn to navigate this new environment [31].

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Conflicts of Interest

The authors declare that they have no conflicts of interest to this work.

Data Availability Statement

The data that support this work are available upon reasonable request to the corresponding author.

Author Contribution Statement

Prado Ortega Mauricio: Conceptualization, Software, Formal analysis, Writing – original draft, Writing – review & editing, Visualization. **Chamba Ojeda Silvia:** Validation, Visualization, Project administration. **Centeno Sandoval Máxima:** Investigation, Data curation. **Rueda Rodríguez Luis:** Software, Resources. **Chamba Gómez Franklin:** Methodology, Formal analysis, Supervision.

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