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Artículo Original

Digital competencies in faculty members at a Chilean private university

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Abstract
In the context of digital transformation in higher education, faculty digital competencies have become essential to ensure a high-quality teaching-learning process. This study analyzes the development of digital competencies among 142 faculty members from a private Chilean university who completed a diploma program. Data were collected using a 24-item Likert-scale self-administered questionnaire focused on specific technical skills. Results reveal an intermediate overall level of competence (M=2.937; SD=22.11), with notable disparities among participants. While some faculty members demonstrated strengths in creating digital materials and using educational technologies, significant weaknesses were identified in academic production and collaboration in digital environments. These findings highlight the need to optimize professional development programs through targeted strategies aimed at closing existing gaps. The study emphasizes the importance of implementing comprehensive and sustained actions that foster equitable growth in digital competencies, enabling faculty to effectively meet the evolving demands of 21st-century higher education.
Keywords: Digital competencies; University faculty; Teacher training; Higher education.

Introduction

In the digital age, higher education is undergoing an unprecedented transformation driven by technological advancements and their increasing integration into pedagogical practices. This shift is fostering more dynamic, interactive, and personalized learning experiences (Lata, 2024). Consequently, faculty members are now expected not only to master their subject matter but also to incorporate digital tools that enrich the teaching and learning process. Digital competencies-which encompass the set of skills needed to effectively use information and communication technologies in educational settings-have become essential for ensuring educational quality in the 21st century. These competencies range from basic management of digital platforms to the design of interactive learning experiences tailored to the needs of digital-native students. In this context, teacher training programs such as diploma courses play a critical role in bridging the gap between traditional pedagogical approaches and contemporary demands, thus contributing to the professionalization of university faculty.

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Despite the acknowledged importance of digital competencies in higher education, there remains a notable lack of studies analyzing the actual impact of teacher training programs on the development of these skills, particularly in Latin American contexts. In Chile, although several higher education institutions (HEIs) have implemented diploma programs and training initiatives to enhance faculty digital competencies, there is little empirical evidence evaluating their effectiveness or identifying areas requiring further attention. Moreover, it is unclear to what extent teaching teams apply these competencies in their daily practices, or what the main limitations are. This gap in knowledge hinders the development of more effective training strategies tailored to the specific realities of university faculty.

Today, digital competencies among university faculty have become a key factor in ensuring the quality of higher education. Digital transformation-accelerated by technological progress and social demands-has introduced new challenges to the teaching-learning process, requiring educators to develop specific skills to effectively integrate digital tools into their pedagogical practice. However, despite their importance, digital competencies among faculty still exhibit significant disparities, both in their level of development and in their application at the micro-curricular level.

On one hand, in many HEIs-particularly in Latin American contexts-faculty members often lack adequate training in digital competencies. In fact, a systematic review on digital competencies among Latin American educators concluded by questioning the technological preparedness of university faculty (Orozco Buele et al., 2023). This shortfall limits their ability to create innovative learning experiences, collaborate in virtual environments, and fully leverage the technological resources available to them. Furthermore, according to the Organisation for Economic Co-operation and Development (OECD, 2023), one of the main barriers to educational advancement is precisely the lack of connectivity and insufficient digital skills. As a result, a considerable gap has emerged between current educational expectations and the actual competencies of faculty members, negatively impacting the quality and relevance of the learning processes offered to students.

This scenario underscores the need to explore the current state of digital competencies among university professors, identifying both strengths and areas for improvement. Understanding this situation is key to developing training strategies that align with the demands of digital transformation and ensure teaching practices capable of addressing 21st-century challenges. Therefore, the purpose of this study is to offer a comprehensive diagnosis to guide concrete actions aimed at strengthening digital competencies among faculty members, thereby generating a positive impact on student learning and overall educational quality. To address this issue, this chapter seeks to answer the following research questions:

- What is the overall level of digital competencies among the group of faculty members who participated in a University Teaching Diploma Program?
- What strengths and weaknesses can be identified in the digital skills of this group?
- What are the main gaps that need to be addressed to ensure comprehensive development of digital competencies among these faculty members?

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Based on these questions, the main objective of this study was to analyze the development of digital competencies in faculty members from a Chilean private university who participated in a University Teaching Diploma Program. Specifically, the study sought to identify strengths and areas for improvement, and to propose targeted recommendations to enhance teacher training programs based on the findings obtained.

Definition and evolution of the concept of cigital competencies

The term digital competencies refers to an individual's ability to use digital technologies critically, creatively, and ethically across various contexts, including educational, professional, and personal settings (Kulju et al., 2024; Lopushniak et al., 2023). These competencies go beyond technical skills, encompassing the capacity to adapt to ever-changing technological demands. According to the report "Towards an Effective Digital", opportunities often come with challenges and uncertainties, particularly when digital technologies are new and evolving rapidly. Leveraging the promises of digital transformation requires careful cost-benefit analysis, along with awareness and mitigation of the associated risks (OECD, 2023). Although some risks are novel and unique to digitalization, many are not—thus, digital risks should be compared with those found in non-digital education.

More specifically, digital competencies comprise a core set of abilities such as accessing, evaluating, creating, and sharing information through digital tools. It is a constantly evolving concept linked to the development of digital technology and the growing expectations of a knowledge-based, digitized society (Spante et al., 2018). These competencies also include the capacity to interpret and analyze information effectively. In educational settings, digital competencies encompass the knowledge, skills, and dispositions required by educators to appropriately and effectively integrate technologies to achieve their pedagogical goals (Serezhkina, 2021).

Consequently, they require a deep understanding of the social, ethical, and legal implications associated with the use of technology (Song, 2021). This includes awareness of online privacy, cybersecurity, and responsible digital interaction. Digital competencies are therefore fundamental for active and effective participation in contemporary society. In this sense, the evolution of the concept has been closely linked to technological progress and the emerging needs of a digital society.
Initially, digital competencies were limited to the technical handling of basic tools such as word processors or email. However, with the development of the internet and the proliferation of mobile devices, the demands on digital skills have diversified to include competencies related to online information management, virtual communication, and complex problem-solving in digital environments (Rahimi & Mosalli, 2025). This reflects the increasing complexity of today's technological ecosystem, especially in areas such as cloud computing, AI-assisted transactions, the Internet of Things (IoT), and adaptive intelligence applications in higher education.

Finally, the evolution of the concept is also evident in international frameworks such as the European Digital Competence Framework (DigComp), which outlines key dimensions for the development of digital competencies, including information literacy, digital content creation, and security in digital environments (Inamorato dos Santos et al., 2023). These frameworks have been designed to address the increasing complexity of digital ecosystems, offering structured guidance for developing essential skills in an era

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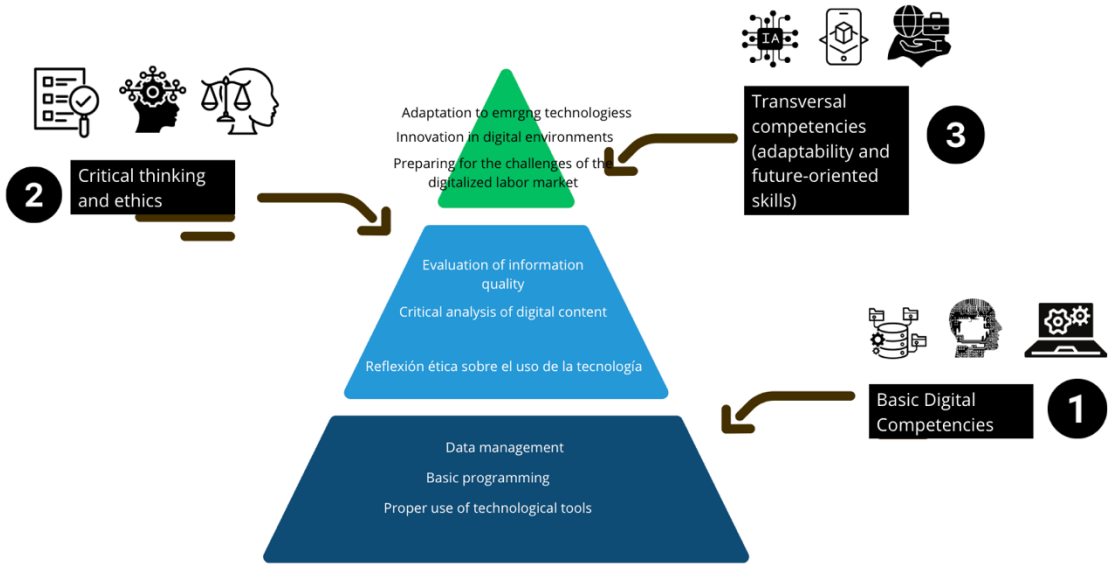
defined by digitalization. They have also enabled higher education institutions (HEIs) to align their training and assessment strategies with international standards. In doing so, they have significantly contributed to standardizing the understanding and measurement of these competencies, adapting them to the demands of the 21st century.

Digital competencies and the future of higher education

As emerging technologies continue to transform teaching and learning methods, digital competencies have become a foundational pillar for the future of higher education. Tools such as artificial intelligence (AI) and augmented reality are enabling more personalized and dynamic learning experiences (Vera, 2023). Likewise, access to digital platforms allows students and teachers to collaborate globally, removing geographical barriers (Mantilla-Carrera et al., 2024). In this regard, the Virtual Engineering Student Teams Project (InVEST), led by the University of Toronto in the field of engineering, has enabled virtual collaboration among students from diverse geographical areas (Ndubuisi & Marzi, 2021, cited in Vera et al., 2025).

However, integrating these competencies requires not only continuous technological skill development among teaching staff, but also a reconfiguration of academic curricula to prioritize digital literacy. As a result, HEIs must take on a proactive role, fostering both the technical development and critical capacity needed to use these tools ethically and effectively (see Figure 1).

Figure 1: *Digital competencies*



Source: Own elaboration.

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In this regard, the development of digital competencies represents both a challenge and a crucial opportunity for the future of higher education.

On the one hand, the increasing digitalization of the labor market requires graduates to possess advanced skills such as data management, basic programming, and adaptability to new technologies (Hien et al., 2021). On the other hand, higher education institutions (HEIs) are challenged to incorporate these competencies into their programs, which entails significant investment in technological infrastructure and faculty training. Moreover, it is not enough to simply teach the use of digital tools; it is essential to foster critical thinking that enables students to evaluate the quality of information and understand the ethical implications of its use (Velasco Domoso et al., 2022; Vera & García-Martínez, 2022). Therefore, a comprehensive approach that combines technical skills, ethical analysis, and adaptability will be key to preparing future generations to face the challenges of a constantly evolving digital environment.

Communication betweenfFaculty and students in the digital era

Modern communication tools have transformed education, making it more interactive and accessible. Synchronous communication platforms, in particular, have facilitated interactions between teachers and students (Belt & Lowenthal, 2023). Consequently, digital tools have become essential to social development and are now indispensable components of the teaching and learning process. Tools such as computers, smartboards, smartphones, and the internet have replaced traditional methods, enriching learning environments and enhancing teaching practices (Tsayang et al., 2020; Vera, 2023; Vera & García-Martínez, 2022). These technologies simplify educational processes, increase knowledge retention, and allow educators to reach broader audiences through online platforms, teleconferences, and multimedia tools. This transformation not only improves access to education but also promotes active engagement and effective collaboration between educators and students, highlighting the fundamental role of technology in modern teaching.

Digital competencies are therefore essential for strengthening effective communication between faculty and students in today's educational landscape (Haleem et al., 2022). These competencies include the use of technological tools such as learning management systems, cloud computing, videoconferencing applications, instant messaging platforms, and artificial intelligence. The ability to use these tools enables faculty to establish accessible and dynamic communication channels regardless of students' geographic locations. Moreover, digital competencies promote the creation of interactive content that facilitates the exchange of ideas and real-time collaboration (Selfa-Sastre et al., 2022). Mastery of these skills also involves ensuring ethical and safe use of technology, fostering privacy and respectful digital interaction. Ultimately, these competencies are critical to enriching educational interaction and ensuring meaningful, personalized learning experiences.

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Method

This study is grounded in a positivist paradigm and adopts a strictly quantitative methodology (Pandey et al., 2023). A non-experimental, cross-sectional research design was selected (Chew, 2019), providing a descriptive approach aimed at detailing the phenomena studied without manipulating variables. By employing a field design, the study collects data directly from participants in their natural settings, ensuring relevance and applicability in real-world contexts. This approach allows for the observation and measurement of variables as they naturally occur, thereby enhancing the validity of the findings.

The non-experimental nature of the study eliminates potential biases from controlled conditions, allowing for accurate capture of the current state of the phenomenon. This methodological framework ensures reliable results and offers valuable insights based on objective and measurable data. The research was conducted at a private university in Chile, known for its national presence and for offering a continuing education program called the Diplomado en Docencia Universitaria (Graduate Certificate in University Teaching). This institution was selected due to its accessibility and its capacity to provide relevant information about the educational experiences of engineering faculty members.

Participants

The sample consisted of 152 faculty members from a private Chilean university who voluntarily participated in a Diplomado en Docencia Universitaria. This convenience sample included 74 men and 78 women, with an average age of 58 years (SD = 11).

Regarding academic qualifications, 29 participants held a Master's degree, while 123 held a Bachelor's degree. Participants were selected based on their enrollment in the academic program, providing practical and non-random access to university teaching staff. This approach enabled the analysis of experiences from a diverse group in terms of gender, age, and academic background, offering a representative view of the challenges and opportunities in faculty professional development within the context of Chilean higher education.

Instrument

For this study, a custom-designed questionnaire was used to assess digital competencies in university teaching. The instrument consists of 24 Likert-scale items measuring frequency of use, knowledge, and faculty perceptions regarding various digital tools and their application in the teaching and learning process. It was designed to cover multiple dimensions of digital competencies relevant to higher education, and its validity was assessed by experts based on criteria of relevance and clarity.

The questionnaire is structured around four key dimensions:

- Creation and Management of Digital Resources (CMDR)
- Professional Development and Lifelong Learning (PDLL)
- Communication, Collaboration, and Professional Networking (CCPN)
- Impact on the Teaching–Learning Process (ITLP)

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This structure responds to the need for a context-specific instrument capable of comprehensively analyzing the use, perception, and integration of digital technologies in university teaching. These dimensions allow for a detailed assessment of digital competencies, considering both classroom application and their influence on teaching and learning processes.

Results and Discussion

Descriptive analysis of the questionnaire completed by 152 participants reveals the items with the highest and lowest scores, highlighting both strengths and areas for improvement in digital competency development among university educators. These results offer a comprehensive view of current practices and training needs related to the use of digital technologies in the teaching–learning process. The following table presents the average scores and standard deviations for each item, organized by dimension to facilitate a more detailed analysis (see Table 1).

Table 1. *Questionnaire Results*

Items	N	M	SD
1. I create study materials using innovative and attractive digital tools.	152	4.236	0.924
2. I research and apply best digital practices shared by fellow educators.	152	2.868	1.149
3. I maintain an active professional online profile to share my academic work.	152	2.763	1.155
4. I manage a personal website where I share my academic experiences and achievements.	152	1.520	1.016
5. I integrate digital tools to design and conduct effective online assessments.	152	2.697	1.362
6. I use digital tools to implement methodologies like flipped learning that promote student autonomy.	152	3.243	1.287
7. I communicate effectively with my students regardless of their geographic location.	152	4.401	0.985
8. I provide options for my students to be assessed online, depending on their time and location availability.	152	2.658	1.343
9. I attend introductory courses to improve my management of digital tools and general applications.	152	3.487	1.518
10. I use various learning management platforms to organize and manage my courses.	152	2.454	1.427
11. I have completed specific courses on the pedagogical use of digital tools.	152	2.421	1.463
12. I participate in communities of practice, both nationally and internationally, to share experiences.	152	2.171	1.331
13. I recognize that digital tools significantly enhance learning through discovery.	152	4.230	1.064
14. I believe that digital tools offer sufficient resources to promote autonomous learning.	152	4.217	0.983
15. I am convinced that digital tools bring multiple benefits to the teaching-learning process.	152	4.349	0.908
16. I perceive that digital tools are transforming traditional teaching and learning practices.	152	3.776	1.117
17. I collaborate with other teachers to create learning resources using digital tools.	152	2.572	1.398

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18. I actively participate in teacher forums to exchange ideas and best practices related to digital tools.	152	2.158	1.163
19. I develop innovative methodological proposals using online resources in collaboration with peers.	152	2.224	1.180
20. I respond quickly and efficiently when asked for support related to digital tools.	152	3.447	1.189
21. I research the use of digital resources from quantitative, qualitative, or mixed-method approaches.	152	3.303	1.116
22. I systematize my academic experiences through research and publications in indexed journals.	152	1.849	1.126
23. I frequently present at conferences, seminars, and webinars, both nationally and internationally.	152	1.520	0.876
24. I regularly attend academic events such as conferences, seminars, and webinars at the national and international level.	152	1.934	1.194
Total	**152**	**2.937**	**1.194**

Note: CMDR = Items 1, 4, 5, 6, 8, 17; CCPN = Items 2, 9, 11, 22, 23, 24; PDLL = Items 3, 7, 12, 18, 19; ITLP = Items 13, 14, 15, 16, 20, 21.
Source: Own elaboration.

Overall, the average score of responses (M = 2.937, SD = 1.194) suggests that while this group of university faculty has integrated certain digital tools into their teaching practices (M = 3.243, SD = 1.287), significant gaps remain in advanced activities related to professional networking (M = 2.171, SD = 1.331) and academic dissemination (M = 1.520; SD = 0.876). This indicates that basic digital competencies are relatively well-developed, whereas skills associated with collaboration and scientific publication require further attention and support.

In particular, the questionnaire results reveal that participating faculty members stand out in aspects related to communication and pedagogical use of digital tools (Belt & Lowentha, 2023; Mantilla-Carrera et al., 2024; Vera & García-Martínez, 2022). One of the most notable strengths is their ability to communicate effectively with students regardless of geographical location (M = 4.401, SD = 0.985). Moreover, these educators recognize the benefits that digital tools bring to the teaching and learning process (M = 4.349, SD = 0.908), and they value their potential to promote autonomous learning (M = 4.217, SD = 0.983) and learning through discovery (M = 4.230, SD = 1.064).

Additionally, a high level of digital competence is observed in the creation of innovative and engaging educational materials using digital tools (M = 4.230, SD = 0.924). These results reflect a strong integration of digital technologies in teaching practices (Tsayang et al., 2020), emphasizing their contribution to the design of learning resources that encourage active and meaningful learning. This also demonstrates that this group of faculty members is not only familiar with digital tools but also effectively uses them to enhance the teaching-learning experience. It reflects a clear commitment to adapting pedagogical strategies to current demands and to promoting innovative educational practices aligned with students' needs in technology-rich environments.

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However, the questionnaire results also highlight critical areas related to participation in collaborative academic activities (M = 2.572, SD = 1.398) and academic dissemination (Vera, 2023). The lowest-scoring items include managing a personal website to share academic achievements (M = 1.520, SD = 1.016) and regularly presenting at national or international conferences and webinars (M = 1.520, SD = 0.876). Participation in communities of practice (M = 2.171, SD = 1.331), development of innovative methodological proposals in collaboration with colleagues (M = 2.224, SD = 1.180), and the systematization of academic experiences in indexed journals (M = 1.849, SD = 1.126) also reveal limited involvement (Vera & García-Martínez, 2022). These findings suggest that although this group of faculty uses digital tools in the teaching-learning process, they are not fully leveraging their potential for professional networking and academic dissemination (M = 2.171; SD = 1.331), possibly due to institutional, training, or time-related barriers.

To complement these findings, the analysis is structured around four key dimensions, offering a comprehensive view of how digital competencies develop within teaching practice. Each dimension groups items that reflect different aspects of digital tool usage, ranging from educational material creation to participation in collaborative and academic activities. Table 2 presents a consolidated analysis of each dimension, highlighting the main findings.

Table 2: *descriptive statistics by dimension*

Dimension	N	M	SD
Creation and Management of Digital Resources (CMDR)	152	2.820	1.281
Professional Development and Lifelong Learning (PDLL)	152	2.347	1.149
Communication, Collaboration and Professional Networks (CCPN)	152	2.743	1.207
Impact on the Teaching-Learning Process (IPEA)	152	3.887	1.122
Total	**152**	**2.949**	**1.190**

Note: CMDR = 1, 4, 5, 6, 8, 17; PDLL = 2, 9, 11, 22, 23, 24; CCPN = 3, 7, 12, 18, 19; ITLP = 13, 14, 15, 16, 20, 21.
Source: Own elaboration.

Analysis of overall results

The results presented in the previous table indicate that, overall, this group of university instructors has integrated digital tools into their teaching practices, albeit with notable differences across the assessed dimensions. The global average (M = 2.949, SD = 1.190) suggests a moderate development of digital competencies, with a particularly positive impact on the teaching-learning process. However, areas for improvement remain, especially regarding ongoing professional development and academic networking. These gaps may be attributed to constraints related to time, resources, or lack of institutional incentives.

Although the value of digital technologies in teaching is acknowledged, the findings clearly point to the need for balanced efforts—combining the practical application of digital tools in the classroom with activities that promote professional development, collaborative networking, and the production of innovative academic content.

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Distribution of means by dimension

Among the four dimensions, *Impact on the Teaching-Learning Process (ITLP)* received the highest average score (M = 3.887, SD = 1.122), underscoring a strong perception of the benefits of digital tools in enhancing learning outcomes. This is followed by *Creation and Management of Digital Resources (CMDR)*, with an average of 2.820 (SD = 1.281), indicating a moderate level of integration in the design of digital educational materials.

Conversely, *Communication, Collaboration, and Professional Networks (CCPN)* and *Professional Development and Lifelong Learning (PDLL)* recorded the lowest mean scores (M = 2.743 and M = 2.347, respectively), revealing limited engagement in academic communities, events, and training activities.

This dimensional analysis highlights the urgent need to implement capacity-building strategies and institutional incentives that foster continuous learning and professional collaboration—key pillars for strengthening digital teaching competencies (see Figure 1).

Figure 1: *Distribution of means by dimension*

Source: Own elaboration

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Final Considerations

These results suggest that, although this group of faculty members has successfully integrated digital technologies into their teaching practices, they tend to prioritize activities that have a direct impact on the teaching-learning process, such as the creation of educational resources (M = 4.230, SD = 0.924) and the use of tools to enhance student interaction (M = 4.401, SD = 0.985). However, activities related to professional development (M = 1.520, SD = 1.016) and academic collaboration (M = 2.572, SD = 1.398) appear to be deprioritized, possibly due to the perception that these do not yield immediate or tangible benefits.

Moreover, factors such as workload, lack of institutional incentives, and limited resources may be hindering faculty engagement in academic events, professional networks, and the production of scientific publications. These findings underscore the need to implement policies and strategies that promote ongoing training, encourage collaboration, and emphasize the relevance of these competencies for comprehensive professional growth.

Conclusions

This study highlights the relevance of digital competencies as a key component of university teaching in the context of digital transformation. The findings reflect an overall intermediate level of digital competency development, with strong integration of digital technologies in the classroom, particularly in areas such as communication and the creation of instructional resources.

Nevertheless, significant gaps remain in more advanced activities such as participation in professional networks and academic dissemination, which require urgent attention. Addressing these gaps calls for comprehensive strategies that include continuous, personalized training programs aimed at fostering involvement in academic communities, developing international collaborative skills, and systematizing teaching experiences through scholarly publications.

Furthermore, it is crucial for higher education institutions (HEIs) to establish policies that actively promote and recognize the professional development of their teaching staff, ensuring training that aligns with the demands of the 21st century. Ultimately, strengthening digital competencies will contribute not only to faculty professional growth but also to enhancing the quality and relevance of educational processes in an ever-evolving technological ecosystem.

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