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# VIRTUAL EDUCATION: A RECOGNIZED NEED AMONG TODAY'S UNIVERSITY STUDENTS

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**Abstract.** Digital transformation and recent technological advances have profoundly impacted various areas of human endeavor, especially education. This transformation has required significant adjustments in how educational activities are implemented, leading to the digitalization and modernization of teaching methods. The current context presents an opportunity to renew and update educational approaches, with a special focus on university classrooms, which have evolved towards synchronous and asynchronous virtual environments. A clear example of this

evolution is the Universidad San Marcos in Costa Rica, on which this article is based, focusing on its transformation and its impact on Costa Rican university higher education, using a case study methodology, triangulation of information, and a mixed approach.

**Keywords.** digital transformation, virtual education, virtuality, virtual environments

# 1. INTRODUCTION

Technological advancements of the last decade have impacted practically all areas of human endeavor, mostly positively, bequeathing great benefits to people. However, this also implies new challenges, adaptations, and transformations. Digital transformation is one of the global processes resulting from these circumstances; technologies enable the production, development, dissemination, and interaction of people in various areas (intellectual, operational, administrative, social, educational, etc.), thus causing those involved to adjust the way they implement their activities and assume an important task in the face of the changes all this entails. Although the scope of this transformation covers different areas, education has significantly felt the adjustments, most likely because it is one of society's basic, hence very dynamic, constant, and essential activities in the formation of thought. This article seeks to explore a specific approach to this topic and addresses the opportunity for humanity to renew educational approaches while renewing and innovating the educational framework by digitalizing it through a brief case study at Universidad San Marcos.

# 2. SAN MARCOS UNIVERSITY

San Marcos University is a higher education institution whose institutional philosophy is student-centered and employs a virtual and hybrid educational model to transform and promote higher education across all sociodemographic regions of Costa Rica (Modelo Educativo, 2024).

This institution has accompanied the academic community since 1922, initially offering training in accounting and commerce. Over time, it has continuously responded to the country's educational needs, developing active higher education strategies and methodologies to meet the increasingly specific and changing demands of university students. In 2016, San Marcos University received approval to offer fully online degree programs in Costa Rica, representing a significant milestone in promoting student learning and performance (Reyes, 2022).

Listening to and understanding the needs of the Costa Rican population, the institution aligns its educational practices with a humanistic approach, complemented by technology, to provide students with the necessary tools to develop as well-rounded professionals. San Marcos University is thus characterized by its inclusive and adaptive educational model.

Education at its various levels represents a fundamental process for the development of technical, social, interpersonal, and even professional skills. Technological advances have long been part of education, although perhaps not as visible as they are today. Currently, the term "educational technology"

plays a significant role in the development of this field.

Software licenses, specialized equipment, new educational methods and formats, as well as numerous technological tools are now employed in educational development. University classrooms have transformed into virtual learning environments where synchronous and asynchronous sessions take place, complemented by new educational perspectives and continuously updated knowledge applications.

## 3. COSTA RICAN SOCIO-EDUCATIONAL CONTEXT

San Marcos University has been a leading educational institution in Costa Rica, yet it is essential to first understand the social, cultural, and educational phenomena that shape the decisions and needs of today's students. In this regard, it is appropriate to ask: How does the implementation of virtual education in Costa Rica contribute to the promotion of equity and inclusion, and why is San Marcos University's virtual modality relevant in the current national context?

In Costa Rica, virtual education proves timely in a country experiencing rapid and ongoing changes. Populations residing far from the Central Valley and the capital lack equal educational infrastructure and opportunities to meet their learning needs with quality.

Information technologies have played a crucial role in enhancing the quality of higher education. However, online education has not been uniformly successful. Rural regions in Costa Rica face substantial challenges regarding internet access and the availability of technological devices, often alongside higher poverty levels and a significant digital divide.

In 2020, during the COVID-19 pandemic, the Costa Rican government and the Ministry of Public Education implemented inter-institutional strategies and efforts to reduce inequities between rural and urban areas. This issue, which became highly visible and severe during the pandemic, was referred to by the government as the "educational blackout" (Noveno Estado de la Educación, 2023).

To address this, financial investments and policy reforms were introduced to improve technological infrastructure and internet connectivity in remote areas, aiming to level the educational playing field. As digital gaps and technophobia began to be addressed, people realized that distance and virtual learning mechanisms could enable professional growth from any location (Noveno Estado de la Educación, 2023).

Consequently, with greater visibility and accessibility of virtual education, the 2023 State of Education report showed a notable increase in the number of individuals aged 18 to 24 who completed secondary education

and enrolled in higher education programs.

**Figura 5.** *Proportion of people aged 18 to 24 who completed secondary school and accessed higher education*
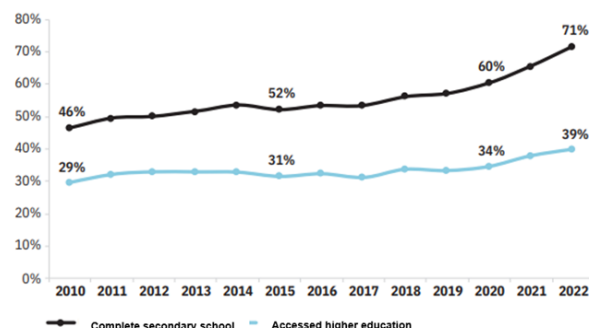


Source: Noveno Estado de la Educación. (2023)

These increases were largely due to improved access for students from higher socioeconomic backgrounds, particularly working adults. Demographic shifts in the country reveal a growing number of students who work and therefore require flexible study options. As a result, virtual education emerges as an ideal solution that accommodates professional obligations without compromising academic achievement.

## 4. EQUITY AND SOCIAL INCLUSION THROUGH VIRTUALITY

argued that attending in-person classes posed challenges due to geographical distance and inflexible study schedules. One of the most valued aspects of virtual education was the opportunity it offered to students who would otherwise face access barriers, particularly

in remote areas far from San José. This highlights that virtual education is viewed as a mechanism for promoting equity and access.

Therefore, the data discussed reveal that San Marcos University effectively addresses the needs of students from rural areas and those who study while working. The programs and resources developed by the institution are designed to foster meaningful learning even in the absence of physical presence, positioning the teacher as a facilitator who provides feedback and evaluates learning processes.

The virtual model ensures equal access to education for students across the country, including those in rural or remote communities, enabling class participation without requiring travel. Additionally, virtual classes offer flexible scheduling options on weekdays and weekends. Social inclusion plays a fundamental role in this modality, as it provides access to numerous educational resources, such as virtual books and academic databases, that might otherwise be unavailable to these students.

The core strength of this virtual educational process lies in eliminating the need for transportation and physical materials, making education more affordable and accessible. This allows students with limited resources or those aiming for professional advancement to continue their academic journey.

As a community-oriented university, San Marcos is committed to delivering education that is flexible, relevant, and socially responsible, tailored to the needs of today's students from all regions of Costa Rica. Its efforts align with the Sustainable Development Goals to positively impact the quality of life for Costa Ricans.

## 5. DIGITAL TRANSFORMATION

Digital transformation did not occur overnight. Although the term may still seem new due to its prevalence in discussions on education, business, and society, it is actually a result of the Fourth Industrial Revolution, as described by Klaus Schwab (Aguilar Sánchez, 2019).

Depending on the generation consulted, different perspectives emerge regarding the origins of today's digital transformation. Some may trace it back to the Industrial Revolution (1760–1840), others to the invention of the first computer around 1945. Each of these milestones contributed to the advancements we witness today.

For the purposes of this article, we consider a more recent era. According to the publication Digital Technologies for a New Future (United Nations, 2021), "since the 1980s, the digital revolution has transformed the economy and society. Initially, it developed a connected economy characterized by widespread internet use and broadband networks, followed by the emergence of a digital economy (...)."

The arrival of the internet marked a before and after in the development of numerous sectors. Although it initially appeared as a technological innovation, its effects quickly extended to communication, economics, science, and education, among other key areas.

"There is no debate that the internet and new technologies are transforming everything in their path, redefining society and the business models of most economic sectors: they impact citizens, consumers, and clients," as noted by Sánchez. In this way, digital transformation continues in various directions, influenced by the sectors it benefits. Innovation, in particular, serves as both a core component and a moderating force, allowing progress to be measured by the degree of innovation achieved through digital means.

## 6. DIGITAL TRANSFORMATION AND EDUCATIONAL INNOVATION

Digital transformation in higher education has revolutionized how knowledge is delivered, received, stored, and adapted, prompting a comprehensive renewal of pedagogical methods and their integration with technological tools.

This process has gone beyond mere content digitalization. It involves restructuring the production, application, evaluation, transformation, and interaction with knowledge, as demonstrated at San Marcos University in Costa Rica. Virtual Learning Environments (VLEs) have not replaced traditional classrooms but enhanced them, creating complementary spaces that elevate the learning experience.

More than simply offering synchronous and asynchronous classes tailored to individual learning needs, virtual education fosters collaboration and horizontal transfer of experiences, ideas, and knowledge locally and globally transcending physical barriers.

Educational innovation, driven by digital transformation, has led to the creation of new tools and platforms that promote interactive and collaborative learning. These include comprehensive learning management systems (e.g., Moodle, Canvas) and virtual session software with educational focus.

Moreover, technologies such as artificial intelligence, augmented reality, and immersive virtual environments have been integrated into various curriculum levels, offering more personalized and engaging learning experiences.

This shift allows higher education institutions to deliver more dynamic and current academic programs aligned with labor market demands an essential function of universities in developing professionals for the future.

An underexplored perspective is how digital transformation has democratized access to higher education by removing geographic barriers and, in some cases, narrowing economic gaps. At San Marcos University, fully virtual degree programs have enabled students in remote areas to access quality higher education directly from their homes.

Today, students from across the globe can enroll in programs from prestigious institutions, expanding learning opportunities and promoting diversity in virtual classrooms. This global knowledge exchange builds a more inclusive and connected academic community capable of addressing contemporary challenges more effectively.

Furthermore, digital transformation demands continuous adaptation from educators, who must regularly update their skills and methodologies to keep pace with technological advancements. While this poses a significant challenge, it also presents an opportunity for teachers to become facilitators of knowledge in digital environments, delivering instruction that is more effective and relevant to current and future generations.

# 7. TRAINING OF EDUCATORS IN THE ERA OF DIGITAL TRANSFORMATION

Training educators within the context of digital transformation and educational innovation has become essential to ensure the effectiveness of university-level education. In a landscape where technological tools and digital platforms play a central role, it is crucial for educators to possess not only traditional pedagogical knowledge but also advanced digital competencies that enable them to make full use of new technologies in the classroom.

Professional development and training programs must be tailored to the realities of the educational environment, addressing the needs of the student community, societal expectations, and labor market requirements. Educator training should not only cover technological tools but also the theoretical shifts in education and pedagogy, including the experimentation and adaptation of methods suitable for a digital learning era.

At San Marcos University, for example, faculty members must be proficient with learning management systems like Canvas. These platforms facilitate course organization and content delivery while offering a wide range of interaction and assessment tools. The ability to design courses that incorporate multimedia resources, discussion forums, and interactive activities is now a core skill for educators in digital environments.

Continuous training in the use of artificial intelligence, through tools like Turnitin, is also crucial. These applications support students in improving their writing skills and help maintain academic integrity. Such tools enhance the quality of student work and faculty guidance alike.

Importantly, these technologies provide both students and educators with opportunities for continuous improvement in their academic performance. The ability to effectively integrate these tools into the teaching and learning process not only improves educational quality but also prepares students for the expectations of the professional world a fundamental mission for universities worldwide.

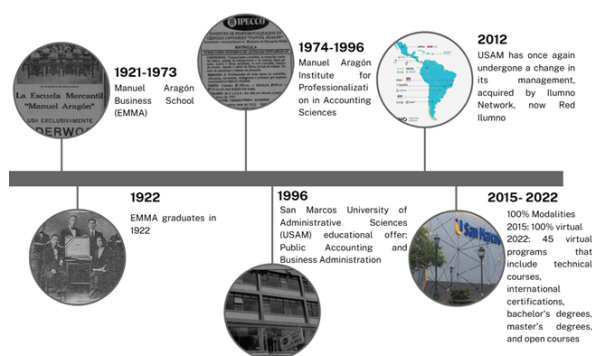# 8. EDUCATIONAL RESOURCES THAT FACILITATE VIRTUAL LEARNING

With over a century of experience in the educational sector, San Marcos University has skillfully navigated the transformations brought by social innovation, adapting to the evolving demands of the private education system to which it belongs.

The above timeline illustrates the institution's trajectory, showing its ability to identify and respond to the educational needs of its environment. In 2015–2016, San Marcos

University began offering fully virtual degree programs, fundamentally changing its approach to educational management.

**Figure 2.** *Timeline: Towards Virtual Education*



Source: Author's own elaboration (2024), based on Valencia Molano (2022)

This transition has allowed the university to recognize virtual education as an efficient method of teaching and learning, supported by tools that facilitate access both within and beyond Costa Rican borders. The university has built a robust technological infrastructure that enables transformative engagement with its academic community.

A key resource is the Canvas learning management system (LMS), described by Instructure (2024) as "a solid foundation for every aspect of higher education." Canvas integrates multiple tools and features that enrich the virtual learning experience.

The university's Virtual Operations team further enhances Canvas by integrating artificial intelligence tools such as Synthesia,

Poly Amazon AWS PlayHT, and HeyHen, creating an immersive experience for both students and faculty.

**Table 1.** *Features of Canvas*

| Management | Canvas API |
|---|---|
| **Research** | Rubrics, modules, calendars, tests, forums, among others |
| **Integration** | Google Classroom, Microsoft Teams, Zoom, Adobe, etc. |
| **Academic Integrity Tools** | Turnitin integration |

Source: Author's own elaboration (2024), based on Instructure (2024)

Canvas also includes a dedicated section for the Center for Learning and Research Resources (CRAI), which hosts mandatory and complementary course bibliographies with direct permanent links. In the past four years, the following bibliographic records have been integrated into Canvas:

**Table 2.** *Number of Bibliographic Resources in Canvas*

| Year | Courses | Bibliographic Entries |
|---|---|---|
| **2019** | 266 | 1,514 |
| **2020** | 85 | 495 |
| **2021** | 273 | 1,794 |
| **2022** | 270 | 1,621 |
| **Total** | **894** | **5,424** |

Source: Author's own elaboration (2024)

The CRAI represents a modern evolution of the traditional library, defined as "a dynamic environment that integrates all resources supporting learning and research at the university" (Desiderata, 2020, p. 63). Key resources include:

**SUWA Repository**

"Suwa" is a Cabécar word meaning knowledge, selected via academic council vote in 2019. The repository preserves and disseminates the intellectual output of the university. As of 2023, it included 2,056 documents:

**Table 3.** *SUWA Repository Content*

| Community | Published | Hidden |
|---|---|---|
| **Virtual Courses (OER)** | 1,657 | 0 |
| **Research (Final Projects)** | 146 | 172 |
| **Faculty Publications** | 64 | 0 |
| **Social Responsibility** | 17 | 0 |
| **Total** | **1,884** | **172** |

Total Documents: 2,056
Source: Author's own elaboration (2024)

**Figure 3.** *Published Documents in SUWA Repository*



- Cursos Virtuales (OA)
- Investigación (TFG)
- Publicación docente
- Responsabilidad Social Universitaria

Source: Author's own elaboration (2024)

Most documents (88%) are learning objects created for courses. Before the repository's creation, these materials lacked proper dissemination. Research final projects make up 8%, faculty publications 3%, and social responsibility documents 1%.

**Institutional Journals**

San Marcos University also publishes the Revista Académica Institucional (RAI), launched in 2019, fully virtual, semiannual,

and under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International license. The journal, led by CRAI, follows Latindex indexing criteria. It includes four sections:

- **Academia:** Academic and scientific articles

- **Administrative Sciences and Education:** Free-topic articles

- **Specialized Writings:** Specialized texts

- **Perspective:** Opinion articles

By 2023, the RAI had 518 article views across 9 editions, publishing a total of 124 articles.

**Table 4.** *Articles Published in RAI*

| Edition | Year | Title | Articles |
|---|---|---|---|
| **1st** | 2019 | Administrative Sciences, Education and Tech | 16 |
| **2nd** | 2020 | Virtual Education and Academic Transformation | 9 |
| **3rd** | 2020 | Opinion and Current Affairs | 8 |
| **4th** | 2021 | STEM Learning Strategies | 11 |
| **5th** | 2021 | Faculty Voices During the Pandemic | 18 |
| **6th** | 2022 | Celebrating Through Action | 15 |
| **7th** | 2022 | Innovation in Virtual Education | 16 |
| **8th** | 2023 | New Era Marketing | 15 |
| **9th** | 2023 | Global Competencies | 16 |
| **Total** | | | **124** |

Source: Author's own elaboration (2024)

**Figure 4.** *RAI Published Articles*
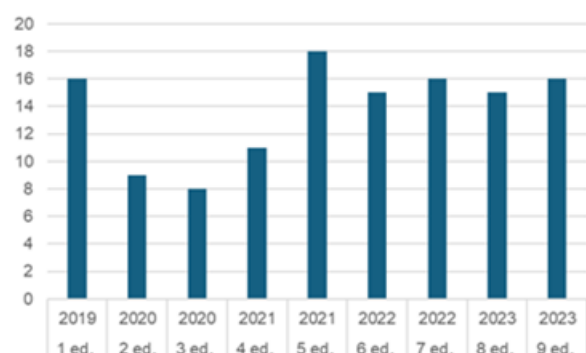


Source: Author's own elaboration (2024)

The fifth edition had the most articles (18), followed by the first, seventh, and ninth editions (16 articles each). The second and third editions had the fewest, published during the pandemic.

The CRAI also leads the AKDMY International Interinstitutional Journal, co-published with Fundación del Área Andina (Colombia) and Universidad del Istmo (Panama). Starting in 2023 with the eighth edition, San Marcos University published eight articles:

**Table 5.** *Articles Published in AKDMY*

| Edition | Year | Theme | Articles |
|---|---|---|---|
| 7th | 2023 | Private Higher Education | 4 |
| 8th | 2023 | Artificial Intelligence in Higher Ed. | 4 |
| **Total** | | | **8** |

Source: Author's own elaboration (2024)

**Figure 5.** *AKDMY Published Articles*



Source: Author's own elaboration (2024)

As of 2024, this journal transitioned to an annual publication.

**CRAI Platforms**

In 2022, USAM launched a dedicated CRAI platform space on its website, offering 33 platforms across 8 categories, including both licensed and open-access tools:

**Table 6.** *CRAI Platform Categories*

| Categories | Platforms/Examples |
|---|---|
| Online Catalog | KOHA |
| Virtual Libraries | E-libro, EBSCOhost, Biblioteca Digital Editorial Tecnológica CR |
| Open Access Resources | RAE Dictionary, OpenLibra, Dialnet, DOAJ, Redalyc, UNData, SCIRP, etc. |
| Digital Repositories | SUWA, Área Andina Repository |
| Electronic Journals | RAI, Digital Math Ed & Internet, Área Andina Journal, AKDMY |
| Thesauri | UNESCO, Merriam-Webster, ILO Thesaurus |
| Research Tools | Turnitin, Creative Commons Licenses, Zotero |
| APA Style Guide | Internal APA Norms Guide |

Source: Author's own elaboration (2024)
Platform Access: *https://www.usanmarcos.ac.cr/servicios/crai-biblioteca/catalogo-bibliografico*

Additionally, CRAI manages the Turnitin similarity-check software, embedded in 100% of the university's courses via Originality licensing. Faculty members review students' similarity percentages directly in the platform.

San Marcos University also acquired Microsoft 365 licenses for student access to Draft Coach, a writing support tool. Usage data from 2023 indicates widespread adoption of academic citation and referencing practices.

**Figure 5.** *Turnitin Originality Statistics*



Source: Personal communication with Turnitin Executive for Central America (2023)

Microsoft 365 complements academic tasks with tools for teaching and learning. Furthermore, in collaboration with Fundación Área Andina (Colombia), USAM offers 32 free MOOCs as of 2024. These virtual courses include 5–6 lessons and a 48-hour duration, with participation certificates adaptable to each learner's schedule.

A key example is the 2022 MOOC titled Practical Guide for Fast and Effective Use of APA Norms, which had strong user engagement through 2023:

**Table 7.** *MOOC Completion Rates*

| Progress | 2022 | 2023 | Total |
|---|---|---|---|
| Less than 25% | 561 | 338 | 899 |
| 25% to 50% | 46 | 72 | 118 |
| 51% to 70% | 8 | 35 | 43 |
| 70% to 99% | 16 | 26 | 42 |
| 100% Completed | 176 | 151 | 327 |
| Total | | | 8 |

Source: Author's own elaboration (2024)

**Figure 6.** *MOOC Completion Percentages*
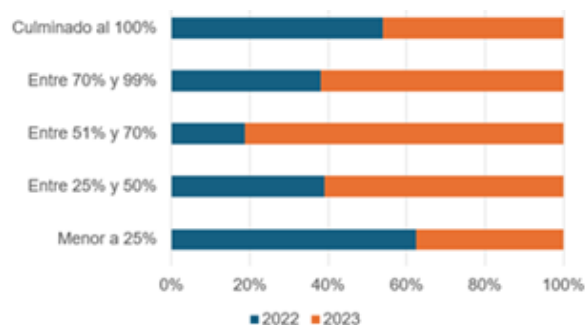


Source: Author's own elaboration (2024)

The highest completion rate occurred in 2022, with 176 users finishing the course entirely. That same year, 561 users completed less than 25%.

In total, 1,429 users accessed and engaged with the platform at some level.

Finally, beyond learning tools, USAM provides administrative platforms to support student services:

- **U Virtual:** Manages student records, enrollments, payments, and academic progress.

- **SAP ERP:** Facilitates university asset management.

- **HubSpot CRM and Zoho CRM:** Optimize marketing, enrollment, and student engagement strategies.

Together, these resources illustrate that a successful virtual education model relies not only on digital infrastructure but also on human capital and physical space, ensuring

high-quality delivery of virtual education both nationally and internationally.

# 9. CONCLUSIONS

Digital transformation and educational innovation have redefined higher education, prompting a profound shift in how teaching and learning are conceived and executed. Technological tools have enabled the creation of more dynamic, interactive, and accessible learning environments, democratizing access to education while enhancing its quality.

Nonetheless, this evolution has also underscored the need for all members of the academic community—faculty, students, and administrators—to acquire new digital competencies. These skills are essential to ensure that the transition toward a digital educational model is not only effective but also sustainable. As demonstrated throughout this article, San Marcos University has successfully led this transformation in Costa Rica.

While the digital transition is necessary for everyone, faculty play a particularly vital role. Their ongoing professional development in the use of educational technologies is not only key to the success of digital education but also positions educators as pivotal agents in the evolution of pedagogical practices.

By mastering tools such as learning management systems, video conferencing

platforms, and artificial intelligence applications, educators can design personalized and relevant learning experiences. These innovations prepare students to meet the challenges of an increasingly interconnected and digitized world.

In this way, digital transformation not only impacts the present of education but also shapes its future, opening new pathways for teaching and learning in the modern era.

# 10. REFERENCES

Aguilar Sánchez, E. (2019). What is digital transformation? San José, Costa Rica: National Archive.

Desiderata. (2020). What is a CRAI? Dialnet. *https://dialnet.unirioja.es/servlet/articulo?codigo=7619654*

Instructure. (2024). Canvas LMS for higher education: The power of Canvas LMS. *https://www.instructure.com/es/educacion-superior/productos/canvas/canvas-lms*

Ministerio de Educación de Colombia. (2022, August). Innovation and digital transformation. Colombia Aprende. *https://colab.colombiaaprende.edu.co/wp-content/uploads/2022/08/Innovacion-y-transformacion-digital.pdf*

Mosquera Yépez, G., Espinoza Roca, L., & Chancay Quimis, J. (2022). Digital transformation and innovation. RECIAMUC, 736–744.

Naciones Unidas. (2021). Digital technologies for a new future. ECLAC Repository. *https://repositorio.cepal.org/server/api/core/bitstreams/879779be-c0a0-4e11-8e08-cf80b41a4fd9/content*

Noveno Estado de la Educación. (2023). Ninth State of Education Report. Programa Estado de la Nación. *https://estadonacion.or.cr/wp-content/uploads/2023/08/EE-2023-Book-DIGITAL.pdf*

Peña, M. E. (2013). Virtual education promotes equity and inclusion. University of Costa Rica News. *https://www.ucr.ac.cr/noticias/2013/09/25/educacion-virtual-promueve-equidad-e-inclusion.html*

Reyes, M. C. (2022). San Marcos University: 100 years transforming the nation's education. Universidad San Marcos. *https://www.usanmarcos.ac.cr/blogs/u-san-marcos-centenario*

Salgado, E. (2015). Teaching and learning in virtual modalities: Experiences of graduate students and professors. Universidad Católica de Costa Rica Anselmo Llorente y la Fuente. *https://www.aacademica.org/edgar.salgado.garcia/2.pdf*

Sánchez, J. (n.d.). Digital transformation and innovation. Barcelona, Spain: Íncipy.

Sola Martínez, T., Garcia Carmona, M., Fuentes Cabrera, A., Rodríguez-García, A.-M., & López Belmonte, J. (2019). Educational innovation in the digital society. Comillas Repository. *https://repositorio.comillas.edu/xmlui/bitstream/handle/11531/44693/Capitulo%2067_Dykinson_INNOVACI%C3%93N_EDUCATIVA_EN_LA_SOCIEDAD_DIGITAL.pdf?sequence=1&isAllowed=y*

Universidad San Marcos. (2024). Educational model. *https://www.usanmarcos.ac.cr/universidad/nosotros/modelo-educativo*

Valencia Molano, M. (2022). An excellent excuse. RAI Journal.